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FLIGHT

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FLIGHT

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Low and Slow

WHETHER airports are to develop along the lines of seaports or of railway stations is a question of great interest to private owners of aeroplanes. The seaport may exist chiefly for the benefit of large liners, but it is still open for the use of small private yachts. On the railways there are no private owners of small engines and coaches, and the traffic control of railway stations is thereby made much more simple. Hitherto the airports have copied the seaports, but, if we are to accept the conclusions of Major Thornton in his article published on page 436, the private aeroplane is likely to be forbidden the use of airports in really bad weather.

Such a prospect may raise a protest from the community of private owners, but it is hard to find a flaw in Major Thornton's chain of reasoning. In conditions known as Q.B.I., the control of commercial aircraft wanting to land is a complicated business, and safety is only achieved at a considerable cost of the journey speed of many of the aircraft. Safety, however, comes before everything, and Major Thornton's picture of a stockbroker in a Hornet Moth with a costly radio set "which he had bought last Monday" sailing into the Croydon zone on a Q.B.I. day makes delightful reading, but, were it fact, would be enough to damage seriously the bookings of all the air lines which use Croydon. When the interests of the travelling public and those of private tourers come into conflict, it is obvious that it is the latter party which must give way. When aeronautical progress meets a new difficulty the solution is often found in designing a different class of aeroplane to avoid that difficulty. It may be that in the future private aeroplanes will fall into two classes, one for the owner who wants to tour overseas, and one for the more modest person who wants to cruise about Great Britain. The former already has a fairly large choice of types, but as yet the home-tourer class has not been fully developed. A good speed range is needed, together with zero landing run and the ability to climb out of a small field with trees round it. Major Thornton foretells that in bad weather the private owner will fly low and slow, and will be forbidden to make use of airports. It might well be added that in fine weather also very great pleasure can be obtained by flying low and slow. The view of the countryside is then more intimate, and therefore more interesting.

One Man's Meat . . .

FLIGHT has for very many years held the view that private flying is more comparable with yachting than with motoring, but that it falls somewhere between the two. Standardisation has been carried far in the car world, and few object to owning a given make because there are thousands exactly like it on the roads. If it gives the performance and comfort demanded at the right price no one thinks of asking very much more.

In the yachting world, on the other hand, a much more individualistic attitude is found. Standardisation is not carried to anything like the same extent as in car manufacture. The very building of a yacht, be it sail, motor or a combination of the two, is a much more "hand-made" task, and scarcely any two owners agree on what is the most suitable internal accommodation, not to mention the vexed question of rig.

When it comes to aircraft suitable for the private owner the position is much the same. In this issue of *Flight* are published the views of a number of private owners on the subject of what is the "ideal" type of aircraft. A perusal of these views brings to light the fact that scarcely any two agree. One wants an open machine, another insists on a cabin. One wants a high-wing monoplane while others prefer the low-wing arrangement. While one demands side-by-side seating for the sake of "sociability," another prefers to sacri-

fice this to some extent for the sake of the better view to both sides obtained in a machine with tandem seating. The man who can afford it, and who does not mind the extra trouble and expense, likes to have two engines because of the extra freedom from hurried forced landings which a duplication of power plants bestows, but in the main private owners are content to make do with a single engine, giving that, perhaps, rather more care and attention than they would give two engines of a twin.

Performance no Fetish

One fact which emerges from the views which we publish this week is that, generally speaking, private owners appear to place far less importance on performance than might have been expected. How often has one heard, when a new machine is produced, the statement that it is a very nice machine, but that its performance is disappointing, that its top speed is only 130 m.p.h., whereas Mr. Brown's machine, of another make, does at least 140 m.p.h. with the same engine. Yet if the private owners quoted in this week's issue of *Flight* are accepted as representing typical views—and they have very varied experiences—performance is not the be-all and end-all of the private owner-pilot's ideal.

This is a view which *Flight* has shared for a very long time, and we think the words of Lord Willoughby de Broke, for example, deserve to be studied carefully. "I feel very strongly," he states, "that the modern tendency of design is getting away from the 'safe and easy' type, that aeroplanes are becoming too much 'aerodrome' machines, instead of being able to use small fields, and they are becoming too much the 'expert's' instead of 'anyone's' aeroplane." After all, not every private owner wishes to use his machine for long-range touring abroad. There are many who do, but probably not the majority. Mr. Lindsay Everard is one of those who do, and he has drawn up a very excellent outline of the sort of aeroplane which meets the needs of the private owner whose inclination is towards foreign touring and whose purse is long enough to stand the strain of employing a professional pilot and of using a twin-engined type, very completely equipped and furnished.

The fact of the matter is, of course, that private flying has not yet reached a stage when the accumulated experience is sufficient to form a basis for very definite future planning; and it may well be that very many years will elapse before constructors settle down to cut and dried ideas and ideals. It is even quite possible that they never will, and that private flying will continue to resemble yachting in the individualistic outlook of its adherents. In the meantime, it is interesting to reflect that *Flight's* review of aircraft types at present available to the private owner discloses the fact that a rather surprising variety is on the market. If some private owners hold that the "ideal" has not yet been evolved, even within the particular class which they select, there is at least good evidence of a serious striving after the combination of features which will meet the requirements of the greatest number of potential purchasers. The whole field is very well covered and the types available range from the small low-priced single-seater of some 20 b.h.p. to the expensive twin-engined aircraft fully equipped with navigation and landing lights and blind-flying instruments.

Reverting to the yachting simile, it would seem that the range from the half-decked sailing boat to the large, seaworthy schooner is rather better catered for than the small craft. The flying equivalent of the sailing dinghy can, perhaps, hardly be said to have arrived yet.

CAPITAL: "London" is the type-name of the Saunders-Roe general purpose flying boat now in production for the R.A.F. This picture shows the first machine "off the line" on the new Saro slipway at Cowes. The engines of the "London" are 690 h.p. Bristol Pegasus III moderately supercharged radials: the top speed is 136 m.p.h. Extreme performance was not aimed at, but rather seaworthiness coupled with versatility. It is understood that this particular machine is likely to visit the Stockholm Show. (*Flight* photograph.)

The Outlook

A Running Commentary on Air Topics

The Cheap Aeroplane

REFERENCE is made in a leading article in this issue to the absence of the aeronautical equivalent to the sailing dinghy. The glider may in some measure be said to represent the cheapest form of flying, but its use is restricted by the need for suitable (i.e., hilly) country. The *Pou-du-Ciel* represents about the cheapest form of power-driven aircraft at the present time, and was originally designed for amateur construction. Consequently, it does not follow that the features which make it simple enough for an amateur to build are necessarily those which would make for cheapness in quantity production by a factory.

An "under-£200" single-seater monoplane is about to emerge from the factory of a firm which has hitherto specialised in *Poux*. Meanwhile, Mr. Noel Pemberton Billing, the founder of the Supermarine Works, but for many years absent from direct aviation interests, returns with a suggestion for a "£100" aeroplane. The Skylark, described and illustrated on page 442, may be the final solution, but, quite frankly, we rather doubt it. Cheapness of production is attained mainly by using welded steel tube construction, and not so much by the fundamental design. There is no obvious reason why welded bicycle tubing should not be assembled into something a little more pleasing to the eye, and, anyway, if and when real mass-production of aircraft comes about, it will probably take the form of a relatively few parts formed on large presses and assembled by a few rivets, bolts, or even welds.

International Design

FEW industries show such marked traces of international influence as does the aviation business, and few necessitate such close co-operation with numerous other industries and such extensive research and experimentation. By way of example, one may quote the cantilever monoplane, which is usually ascribed to the late Professor Hugo Junkers, of Dessau. Actually, the first cantilever monoplane was a special Antoinette designed and built in France in about 1909; in addition, that machine had "trousered" cantilever undercarriage legs. Wing warping was introduced by the Wright brothers, and flaps by the early French, German, and British designers. The automatic slot was invented simultaneously in England and in Germany, although it is now apt to be looked upon as a purely British invention. "Stressed-skin" construction is mainly associated with America, and yet probably the first aeroplane in which this form of construction was used throughout was the "Silver Streak" of Short Brothers, shown at Olympia just after the war. Trailing-edge flaps, so popular of recent years, bear American and German names, but Mr. C. R. Fairey introduced the trailing-edge flap as a lift-getting device years before it was taken up by anyone else. One might go on enumerating instances of a similar character.

Value of Co-operation

WHILE the results of international co-operation are obviously to be seen in nearly all modern British and American aircraft, the value of co-operation between different sections of any nation's aviation industry is scarcely of less importance. The late Mr. Hillman outlined the requirements which led to the production of the De Havilland Dragon, from which, in turn, have developed a number of more recent types. Before long we may see what co-operation between five major American air lines and a prominent firm of aircraft constructors can produce, for American Airlines, Eastern Air Lines, Pan American Airways, Transcontinental and Western Air, and United Air Lines have signed a contract with the Douglas Aircraft Company for the development of a forty-passenger monoplane.

These companies have been prompted by lack of a Government subsidy—at least in the form in which it is known to us—to consolidate the knowledge and experience of their pilots, technical and operating staffs. The machine concerned should have, according to preliminary specifications, a cruising speed of 193 m.p.h., using 60 per cent. available power, and will weigh about 25 tons. There will be four engines of 1,000 h.p., and the span will be 140ft.

In Europe, Too

ARMSTRONG WHITWORTH'S are building for Imperial Airways a fleet of large four-engined monoplanes. Farman is doing the same for Air France. In fact, the four-engined machine, accommodating about forty people by day, bids fair to achieve universal popularity. We in this country are already aware of the merits of this type, having operated it on a large scale for about six years. America has had less experience. The development of the big Fokker F-32 built over there a few years back was never pursued; the Boeing 299 bomber represents their latest large four-engined effort—seemingly a very stout one. France knows more of the structural than of the operating end. The rest of Europe knows what it has learned from England, Holland, France, and America.

The Douglas will not be in regular service before 1938, by which time the new Armstrong Whitworths and Farmans should be well established.

A Twelve Hours' Race?

GRADUALLY the number of air races held annually in this country has dwindled, until the King's Cup Race is the only really great air speed event of the year. It is not easy to make an air race attractive without going to the trouble and expense of a very elaborate organisation. A race which has been gaining steadily in popularity in France is the *Douze Heures d'Anger*. This year it will be held on July 5, and already thirty-six entries have been received, although entries are accepted at increased fee up till June 14. The rules of previous races have been simplicity itself: The engine capacity was limited, as in the Coupe Deutsch, to eight litres. For the rest, competitors pleased themselves, the object being to cover the greatest possible distance in twelve hours. Machines start at 6 a.m., and the one which has flown the greatest number of laps by 6 p.m. is the winner.

This year an innovation has been introduced by dividing competitors into three classes: with engines up to two litres; from two to four litres, and from four to eight litres. The fact that competitors can refuel as often or as seldom as they like gives rise to some speculation about the number of times it will pay for any given machine to refuel, and the correct estimate of this, as well as good navigation and course-keeping, may make all the difference between two identical machines. Thus there should be plenty of excitement, and towards evening one would expect a considerable crowd at the aerodrome where the finish is held.

MODERN LIGHT AIRCRAFT

Private-owner, Club and School ... Described from the ...

Illustrated chiefly with "Flight" photographs ...

AERONCA

AFTER Mr. Llewellyn's demonstration flight in an Aeronca to Johannesburg, even those earnest critics who had never heard of the tremendous amount of really hard work done by this little machine in Canada and the United States must have realised that it is no plaything. Allowing in generous measure for this particular pilot's skill and endurance, it is obvious that the little machine is capable of hard work in the hands of anyone who is prepared to make the necessary allowances for an engine with an output of less than 40 h.p.

The Aeronca is a high-wing wire-braced monoplane of mixed construction in which the pilot and passenger sit side-by-side in an enclosed cabin, with side panels which can be opened when, for instance, the screen is obscured in really bad weather. The cabin is wide enough for two people of normal size, and since they sit together at the centre of gravity, there is no real need for a trimming control in such a light machine. Brakes are, however, fitted, and can be used firmly without a risk of nosing over. Although the high position of the engine tends to restrict the view immediately ahead, the view in all essential directions is good. There is a luggage locker behind the cabin. Nothing about the Aeronca's flying and landing qualities is likely to worry the novice.

A luxury model in the form of a low-wing cantilever monoplane has been produced on the other side of the Atlantic, and it seems possible that we shall see it here in due course.

The cabin arrangements of the Aeronca, which is itself depicted on the left. It will be seen that, in the present form at least, the throttle is centrally placed. On the right is shown the seating and luggage compartment layout. The side windows can be opened.

The specification of the standard Aeronca is as follows: Span, 36ft. length, 20ft.; weight empty, 629lb.; disposable load, 437lb; maximum speed, 95 m.p.h.; cruising speed, 87 m.p.h.; landing speed, 33 m.p.h.; initial climb, 450ft./min.; cruising range, 305 miles; price (with full equipment), £395. Makers: Light Aircraft, Ltd., 7, Park Lane, London, W.1.

AIRSPEED

THE Airspeed Courier, though designed several years ago, is still perfectly capable of holding its own in the matter of all-round performance with the majority of the latest products. Furthermore, this was almost the first, if not actually the first, machine to be built in this country with a retractable undercarriage.

Mainly of wood construction, the Courier is a single-engined low-wing cantilever monoplane carrying a pilot and five passengers, though this arrangement can, of course, be modified to suit individual requirements of accommodation and range. Two alternative power units are normally fitted—an Armstrong Siddeley Lynx of 223 h.p. or a Siddeley Cheetah V of 278 h.p.—the latter being normal for the overseas version. The maximum speeds of the two models are 153 and 165 m.p.h. respectively.

Dual control is fitted and both control columns are detachable, so that the pilot may fly from either of the two front seats. The Courier must be one of the "lightest" cabin machines on the market, since even the roof windows extend well back and there is little solid matter to interfere with the pilot's view.

The twin-engined Envoy is somewhat outside the scope of these short descriptions, but it would make a very fast and luxurious air yacht and, in its new form with split trailing-edge flaps, it is extremely easy to fly and capable of being put down in the smallest of aerodromes. Incidentally, the Courier which was delivered to the Air Ministry early in 1934 has been experimentally fitted with slots and Schrenck flaps, and tests at Portsmouth have shown that it is a very remarkable machine.

The specification of the Courier with a Lynx engine is as follows: Span, 47ft.; length, 28.5ft.; all-up weight, 3,900lb.; useful load, 1,790lb.; maximum speed, 153 m.p.h.; cruising speed, 132 m.p.h.; landing speed, 56 m.p.h.; initial climb, 730 ft./min.; range, 600 miles. Makers: Airspeed (1934), Ltd., The Airport, Portsmouth.

The excellent view from the Courier's cabin is well shown in this flying picture, taken while the retractable undercarriage was "at the ready."

A REVIEWED

...hool ...e British Market : Their Features ... Amateur Pilot

...erior drawings by MAX A. MILLAR

AUTOGIRO

WITHIN the next few months, it would seem, some very important developments will appear in the autogiratory world. The Cierva Company has always looked upon each new type largely as another step towards an ultimate goal, and we are now waiting for the direct-start type which has been in the course of development for the past year or so. By the simple expedient of altering the axes of the rotor blade hinges and increasing the speed of the initial rotation, a temporary vertical ascent is obtained, and before the machine has time to sink back to the ground it is being pulled forward by the airscrew.

In the meantime, the present C.30 type continues to do good work, and its performance is, in many important respects, considerably superior to that of the normal fixed-wing aeroplane. Height can be maintained at a forward speed of 15 m.p.h., and the actual contact with the ground is made at 5 m.p.h. or less, while the cruising speed is high enough for all normal purposes.

A special technique is, of course, necessary when flying the Autogiro, but to anyone who is not a dyed-in-the-wool aeroplane pilot this presents few difficulties. A certain sequence of actions must be made while running up the rotor to 180 r.p.m., releasing the brakes and opening the throttle for the take-off, which is made with the tail wheel in contact with the ground to the very last. The final approach is usually carried in a normal manner at an air speed of 35 to 40 m.p.h. —though it is useful, of course, to be able to sink vertically, if necessary, during the earlier phases of the approach—and the hold-off and landing are made in the ordinary way, but at a greater height and with considerably greater deliberation.

An unusual view of a C.30 Autogiro obtained at the moment when it was sinking vertically on to the ground at Hanworth.

After touching, the stick is pushed forward so as to lose all lift, and if there is anything of a strong wind blowing, the rotor should be stopped after turning to the left out of wind.

Licences for the manufacture of various types have been granted to A. V. Roe and Company, to Westland Aircraft, and to G. and J. Weir, while the master patents are held by the Cierva Autogiro Co., Ltd., of Bush House, Aldwych, London, W.C.2.

AVRO

SINCE pre-war days the firm of A. V. Roe and Company has specialised very largely in the production of training types and the famous "504" was actually the standard Service trainer for some fifteen years, until the Tutor was adopted. Any Avro machine, therefore, can be reasonably expected to possess nicely harmonised and effective controls as well as generally easy—but not *too* easy!—flying qualities. Some years ago the company introduced a smaller version of the Tutor which, while retaining all the good qualities of the larger machine, would be less expensive to operate and more suited to the needs of civil clubs and schools.

This year the Avro 643 has been produced as a single standardised machine to take the place of the staggered and Club Cadets previously manufactured. In this new model the whole airframe has been strengthened, a castering tail-wheel is fitted and the power unit is the latest Genet Major Mk. I a, which gives about 15 more b.h.p. and so reduces the take-off run. Full blind-flying equipment is standard for both cockpits and a simple inverted-flying fuel system can be installed if required.

Those pilots who have been lucky enough to fly one of the Cadet breed will agree that, as an aeroplane pure and simple, it has few competitors. Although it is possible to make it perform any aerobatic manœuvre known to pilots, it is, at the same time, a most stable and docile creature in the course of normal flight. The Cadet or 643 can, for instance, be sunk on a level keel with the stick held right back so long as the rudder is not too severely interfered with, and it is safe to glide at extraordinarily low speeds. The act of landing is the easiest imaginable, and the undercarriage will take anything within reason.

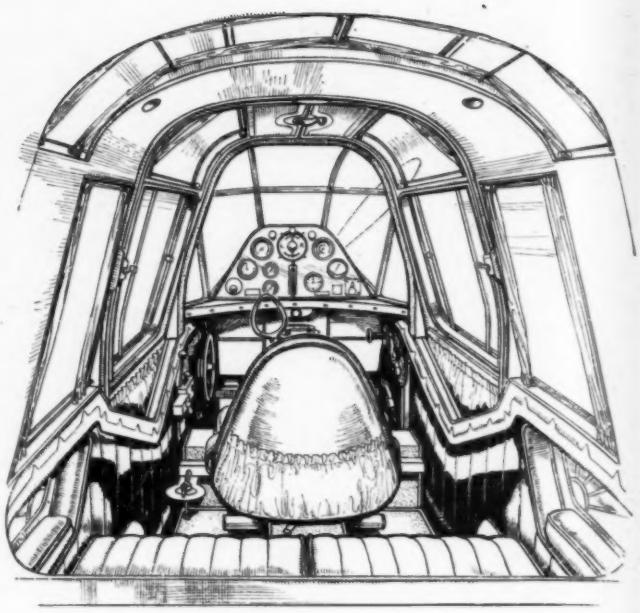
The specification of the Avro 643 is as follows: Span, 30ft.; length, 24ft. 9in.; tare weight, 1,286lb.; all-up weight (with aerobatic C. of A.), 2,000lb.; maximum speed, 110 m.p.h.; stalling speed, 43 m.p.h.; duration at cruising speed, 3.25 hr.; initial rate of climb, 700 ft./min.; service ceiling, 12,000ft. Makers: A. V. Roe and Co., Ltd., Newton Heath, Manchester.

The latest addition to the Avro range of trainers—the 643, which replaces the Club and standard Cadets. Certain modifications have been made to improve the machine from the tuitional standpoint, and the airframe has been strengthened.

BRITISH AIRCRAFT

NOW that several flying clubs have adopted the B.A. Swallow as a trainer, this interesting little machine may be said to be coming fully into its own. Not that its value lies solely in the fact that it is one of the safest and easiest machines to fly; its performance at the top end of the scale is extraordinarily good when the comparatively low power and extremely low landing speed are remembered. Furthermore, its cruising range is of the order required for Continental touring. A small gravity tank is fed by pump from the main tanks, and the total fuel supply suffices for 4½ hours' flying.

With a cockpit starter it is possible, at a safe height, to stop the Pobjoy radial altogether and to soar about the sky with no sound other than the faint whistle of the wind, and the cockpits are so well-screened that it is a pleasure to fly without helmet or goggles. The handling qualities, though not quite perfect in the matter of control harmonisation, are excellent in their absence of vice, and the pilot can hold the stick right back and apply full rudder with no worse results than a spiral. Consequently, the Swallow can be held at or near the stall with perfect safety while making a short approach, provided that the nose is dipped at the last in order to obtain full control for the landing. One or two amateur pilots who have been unable to "solo" safely on other machines have been passed out on the Swallow—a fact which speaks for itself.



The specification of the Pobjoy-Swallow is as follows: Span folded, 15ft. 11in; length, 27ft.; weight empty, 930lb.; disposable load, 570lb.; maximum speed, 112 m.p.h.; cruising speed, 98 m.p.h.; landing speed, 30 m.p.h.; initial rate of climb, 800 ft.-min.; endurance at cruising speed, 4.5 hr. Price, £725.

In a different category, though also a low-wing monoplane, is the Eagle, a three-seater cabin machine with a D.H. Gipsy Major engine and a retractable undercarriage. Work by Rumbold has made the latest version of the Eagle one of the quietest cabin machines on the market, and it is, withal, comfortable and easy to fly. During last season it was successful in a number of races in this country, and it will be remembered that this machine put up a temporary record for the South Atlantic crossing.

As in the case of the Swallow, the Eagle is of all-wood construction the wings being capable of folding to reduce storage space. The retractable undercarriage is manually operated by means of an easily turned handle on the pilot's right and, until it is in the down position, the throttle cannot be fully closed. Retracting takes a matter of seconds.

Although still in the experimental stage, the new Double Eagle may be mentioned as a machine which is likely to be of interest to the private owner as well as to the small airline operator. Primarily a high-wing monoplane, with all its advantages in the matter of passenger view, the Double Eagle will exhibit a number of interesting control and constructional features.

The amount of transparent area is particularly noticeable in this sketch of the interior of the B.A. Eagle. The undercarriage handle can be seen on the right of the pilot's seat, while the diagram shows the seating and luggage arrangements.

The specification of the Eagle is as follows: Span folded, 14ft. 10in.; length, 26ft.; weight empty, 1,450lb.; disposable load, 950lb.; maximum speed, 148 m.p.h.; cruising speed, 130 m.p.h.; landing speed, 45 m.p.h.; initial rate of climb, 700 ft.-min.; range at cruising speed, 650 miles. Price, £1,250. Makers: The British Aircraft Mfg. Co., Ltd., Hanworth Aerodrome, Feltham, Middlesex.

COMFORT AND SECURITY: TWO POPULAR TYPES FROM THE B.A. FACTORY

Two extremes in one class from the same factory. Above is the B.A. Swallow and on the right is the Eagle, which, with three occupants and their luggage, cruises at 130 m.p.h. The Swallow has an enviable reputation for safe and easy handling.

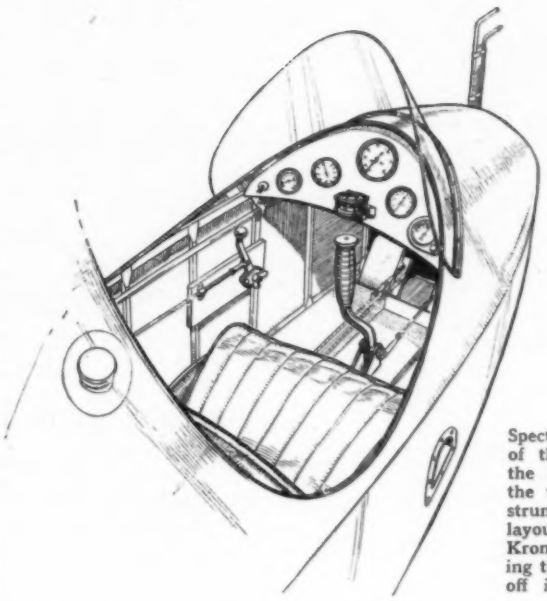
B.A.C.

FOR a number of years certain private owners and club pilots have been asking for a pusher type, and those among them who have had a chance of flying the Drone or the Super Drone—the newest version—must have stepped out of this little machine feeling all the more certain that pusher flying is real flying.

Nowadays, the Super Drone is something a good deal more than a glider with an engine, and Lord Sempill's flight to Berlin and back has shown that it can do a heavy job of work so long as the pilot is not too impatient. With a cruising speed of 60 m.p.h. it is not always possible to make a journey according to plan, though the five-hour endurance is very useful when head winds are encountered. Nevertheless, its ability to fly safely at something under 25 m.p.h. means that the Drone pilot can be out and about when others are eating their heads off on the tarmac. The machine was originally developed by the late Mr. Lowe-Wylde in 1932, and the new company was formed last year.

Certainly, the Super Drone is one of the most intriguing machines in the air that it is possible to imagine and, furthermore, it is just about as safe as anything could be. The pilot has a complete range of forward visibility and, with no slipstream to bother him, he can fly naked and unashamed without discomfort. The landing is simplicity itself, and the stall produces nothing worse than a momentary dip of the nose; full rudder with the stick back involves a steep spiral which corrects itself as soon as the stick is eased forward again. Even to the pilot who is accustomed to the vitality of the normal machine the controls are not unduly sloppy, though there is, at low speeds, a certain tendency for the Super Drone to take its own time over entering turns and stopping gentle yawing movements.

Various people on the Continent have interested themselves in the machine, and building licences have been granted to firms in France, Belgium, and Holland. A 750 c.c. Douglas engine is the standard power unit.

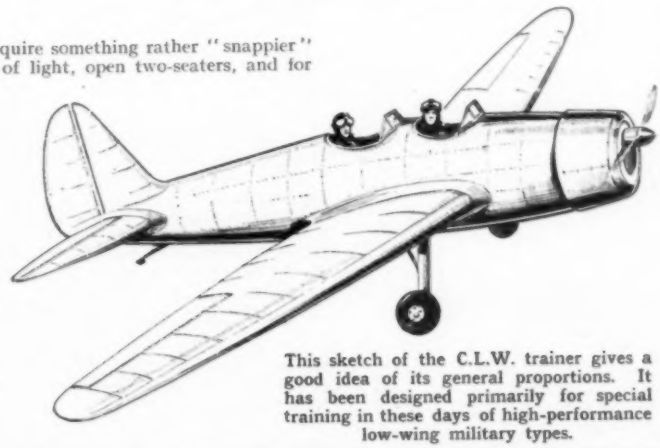


Spectator's and pilot's views of the Super Drone. On the left are the controls, the very full array of instruments and the cockpit layout, while above Mr. Kronfeld is "resting" during the business of showing off its paces in the air.

The specification of the Super Drone is as follows: Span folded, 10ft.; length, 27ft. 10in.; weight empty, 390lb.; disposable load, 250lb.; maximum speed, 70 m.p.h.; cruising speed, 60 m.p.h.; landing speed, 22 m.p.h.; initial rate of climb, 380 ft./min.; cruising range, 300 miles. Price, £275. Makers: B.A.C. (1935), Ltd., Hanworth Aerodrome, Feltham, Mddx.

C.L.W.

THERE are those who require something rather "snappier" than the ordinary run of light, open two-seaters, and for these there is, or soon will be, the C.L.W. Trainer. This type is intended primarily for instruction preparatory to flying modern high-performance military types, and, in consequence, is likely to be "a real aeroplane," as opposed to those types which have some of the flying characteristics of a feather. The 90 h.p. Pobjoy Niagara III is being specified for the prototype, but the 130 h.p. Gipsy Major will be optional.



This sketch of the C.L.W. trainer gives a good idea of its general proportions. It has been designed primarily for special training in these days of high-performance low-wing military types.

Structurally, the machine is of quite unusual interest because it embodies a metal stressed-skin fuselage and a new form of wing construction. With the Pobjoy the maximum speed should be 135 m.p.h.; the Gipsy Major will add another 15 m.p.h., with a slight increase in landing speed.

The manufacturers contend that the pupil should be put in the front cockpit, as this will accustom him to the sensation of flying with no one in sight.

Makers: The C.L.W. Aviation Co., Ltd., Gravesend Airport, Kent.

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D.H.

AS the lineal successor of the series of machines which, to a very large degree, made private and club flying possible in this country, the D.H. Hornet Moth is one of the most interesting machines in the light aeroplane class. It represents the fruit of unrivalled experience in the needs of the private and club market, and is, withal, a very delightful machine to fly. All normal evolutions, up to a near-vertical turn, can be carried out on the stick alone, and, with the new wings, the stall is innocuous enough to rid bad landings of minor dangers.

The machine is quiet, so that a pupil and instructor can converse normally, and the view in the forward hemisphere is particularly good for a single-engined machine. The cabin is roomy and there is ample space for luggage behind the two seats. Even the most cautious pilot will be glad to feel that the Hornet has been stressed for aerobatics, though such antics are not legally permissible without alterations to the door fittings to facilitate parachute departures.

The specification of the Hornet Moth is as follows: Weight empty, 1,255lb.; disposable load, 695lb.; folded span, 9ft. 9in.; length, 25ft.; maximum speed, 121-124 m.p.h.; cruising speed, 103-105 m.p.h.; landing speed, 40 m.p.h.; climb to 5,000 ft., 8.25 min.; endurance, 6 hr.; price £875.

For the owner who intends to use a machine for really serious long-distance touring at all times of the year, multiplied power units are almost essential, as well as night- and blind-flying equipment, and provision for two-way radio if this is specified. The D.H. Dragonfly is a machine in the "air liner" class, which is, at the same time, almost as easy to fly as a normal single-engined aeroplane. Comfort has been studied very seriously indeed, and the noises of exhaust and airflow have been reduced to a remarkable extent.

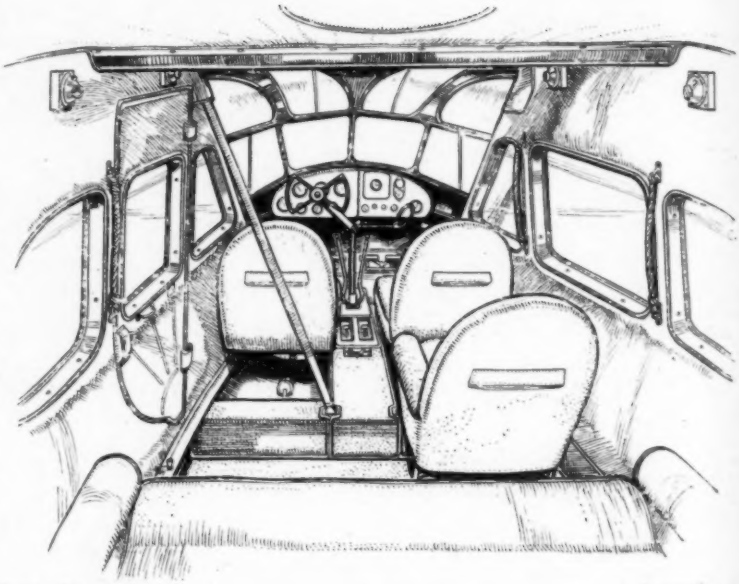
Generally speaking, the same tactics are used in flying this machine as in flying any other cabin craft, and with the flaps down, the approach angle is as steep as that, for instance, of the Hornet Moth. Dual control is fitted, and the instruments include a Sperry artificial horizon and directional gyro, electrically operated revolution counters and an Air Log. Special attention has been paid to the interior furnishing in order that the machine shall compare more than favourably, in this respect, with a first-class car.

The specification of the D.H. Dragonfly is as follows: Weight empty, 2,500lb.; disposable load, 1,500lb.; span, 43ft.; length, 31ft. 8in.; maximum speed, 144-147 m.p.h.; cruising speed, at 1,000ft., 127-130 m.p.h.; climb to 5,000ft., 7.5 min.; range, 885 miles; price, £2,650.

For those who want a rather higher speed and a longer range than those provided by the Hornet, there is still the Leopard Moth, which can be considered to be the descendant of the ever-popular Puss Moth and has many of the same pleasant characteristics. With a Gipsy Major engine the Leopard Moth carries three people at a cruising speed of 117 m.p.h.

Although the Moth as we knew it is dead, the Tiger Moth is very much alive, and is used as a primary trainer all over the world. Since it is an excellent aerobatic performer, the word "primary" does not imply that its value as a trainer ends after a pupil's first solo.

The specification of the Leopard Moth is as follows: Span, folded, 12ft. 10in.; length, 26ft. 6in.; weight empty, 1,405lb.; disposable load, 820lb.; maximum speed, 138 m.p.h.; cruising speed at 1,000ft., 117 m.p.h.; stalling speed, 50 m.p.h.; initial climb, 625 ft./min; range, 605 miles. Makers: De Havilland Aircraft Co., Ltd., Hatfield, Herts.



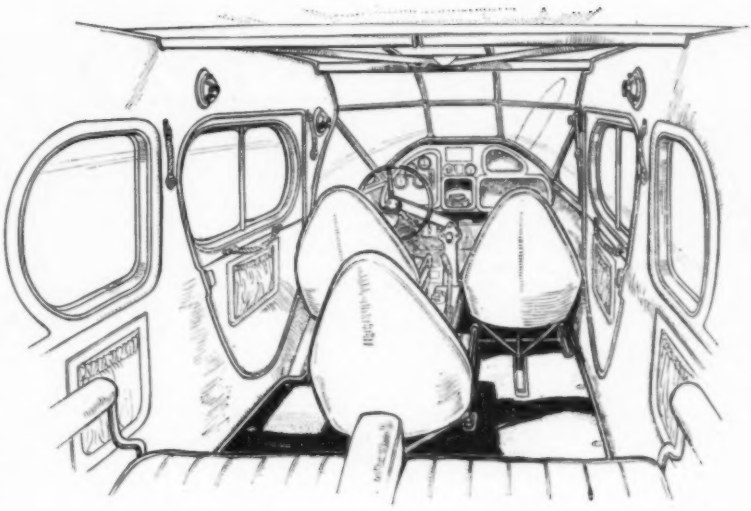
The cabin of the D.H. Dragonfly is light and roomy and both soundproofing and ventilation have been carefully studied. If a radio set is required, this is mounted immediately behind the pilot's seat. As will be seen from the diagram, the luggage is carried in a separate compartment which is reached from the outside.

In its new form the Hornet Moth has a remarkably short take-off and climbs steeply as soon as it is clear of the ground. As may be gathered, both pilot and passenger have an excellent view in the forward hemisphere as well as through the roof light.

HESTON PHŒNIX

AN ability to carry five people at a cruising speed of more than 125 m.p.h. on the two hundred horse-power of a Gipsy Six engine is the outstanding feature of the Heston Aircraft Company's Phœnix. All five occupants have the good view which is to be expected with the high-wing layout, and they travel in a state of peace and quiet which is certainly unusually good for a single-engined machine.

From the design point of view the Phœnix, which is of all-wood construction, is interesting by virtue of the monocoque rear portion of the fuselage and of the Dowty retractable undercarriage which is gathered up into a pair of stub wings from which the bracing struts run to the wings. The cabin space is entirely unobstructed and the business of entering or leaving the machine would have no difficulties for the most infirm. Comfort has, in fact, been the primary aim of the designers, and the unusual roominess of the cabin will please both fare-paying passengers and others.



Two doors are provided in the Heston Phœnix and the seating arrangements can be modified according to the use to which the machine is to be put. The luggage compartment at the rear has a separate door and, though both are not shown in the diagram, there are two doors for the cabin.

The control wheel is of the swing-over type, and the essential controls are centrally placed so that the machine can be flown from either of the two front seats. A very large locker in the dashboard is available for maps and for all the assorted material which the pilot usually has to strew on the floor. The undercarriage, which is hydraulically operated, can be lowered in a matter of sixteen seconds.

Although the Phœnix has been designed primarily for charter, feeder-line and similar work, the machine's virtues of silence, simplicity and economy should appeal to the private owner who requires something rather larger and more luxurious than usual, yet who does not want the additional complication of twin engines. When in the raised position the wheels lie in recesses in the lower stub wings already mentioned. The trenches provided for the reception of the struts are covered by a shield so that when the wheels are up the whole underside is left smooth. This, of course, greatly facilitates emergency landings with the wheels retracted. A tail wheel of the fully castoring and spatted type is fitted.

The specification of the Heston Phœnix is as follows: Weight empty, 2,000lb.; disposable load, 1,300lb.; span, 40ft. 4in.; length, 30ft. 2in.; maximum speed, 145 m.p.h.; cruising speed, 125 m.p.h.; landing speed, 55 m.p.h.; initial rate of climb, 650 ft./min.; cruising range, 500 miles; price, £1,980. Makers: Heston Aircraft Co., Ltd., Heston Airport, Hounslow, Mddx.

HILLSON PRAGA

WITHIN the next month or so we should see the first of the Manchester-produced versions of the Praga Baby, a machine in the ultra-light class which has interested amateur pilots since it was first shown in this country by the Czechoslovakian manufacturers last summer. A high-wing cantilever two-seater cabin monoplane, the Praga is of extremely clean design and cruises at something like 80 m.p.h. on a flat-twin engine of about 40 h.p.

It is easy to fly and has a completely harmless stall—so much so that it really appears to be impossible to make it do anything out of the ordinary by misuse of the controls. Incorrect rigging caused the original demonstrator to be somewhat heavy on the ailerons, but these were effective enough to make the fact only incidentally noticeable. At his first attempt the pilot would probably find himself overshooting slightly on his approach, as the glide path is extremely flat, and this is likely to be the only trouble that he would experience. Full sideslips are not possible, but a most effective crab sideslip can be held indefinitely, and the machine, in any case, can be sat over or near the aerodrome boundary at the stall and sinking rapidly until such a moment as more speed is deemed to be desirable for the final hold-off and landing.

The side-by-side accommodation is ample for persons of normal stature, and there is a luggage space at the rear of the cabin. The forward view over the engine is excellent, though there is a lack of rearward view which might, at first, worry the pilot who has been brought up on open machines. Simply and sturdily built, the Praga should require very little maintenance.

The wing, fuselage, fin and rudder are entirely of wood and have plywood covering: the engine mounting, undercarriage, tailplane and elevator are of welded steel tubing, the horizontal surfaces being fabric-covered.

A Praga flat-twin air-cooled engine giving 36 h.p. at 2,400 r.p.m. is fitted as standard. This is of 113.5 cu. in. capacity and is claimed to be extremely economical in the matter of fuel consumption. The main petrol tank is in the wing behind the cabin, the feed being by gravity.

The specification of the Hillson Praga is as follows: Weight empty, 584lb., disposable load, 445lb.; span, 36ft.; length, 21.5ft.; maximum speed, 93.3 m.p.h.; cruising speed, 79.6 m.p.h.; landing speed, 37.3 m.p.h.; climb in three minutes, 1,310ft.; duration, 3.5 hr.; price £385. Makers: F. Hills and Sons, Ltd., Trafford Park, Manchester.

The clean lines and simple design of the Hillson Praga are apparent in this view, which shows also the forward field of view available for the pilot and passenger.

MILES

SINCE 1933, when the original Miles Hawk appeared, Phillips and Powis Aircraft have gone from strength to strength, and their range of machines, from the M.5, or Sparrow Hawk, to the twin-engined Peregrine, numbers about eight, if the special Air Ministry machine, known as the Hawcon, is included. The chief designer, Mr. F. G. Miles, can be said to have done as much as anyone to develop the cantilever low-wing tradition in this country. Furthermore, the Hawk Major, first introduced in 1934, was the first British aeroplane to appear with split flaps, and since that time all new Miles machines have been fitted with these aids to slower flying and steeper approaches.

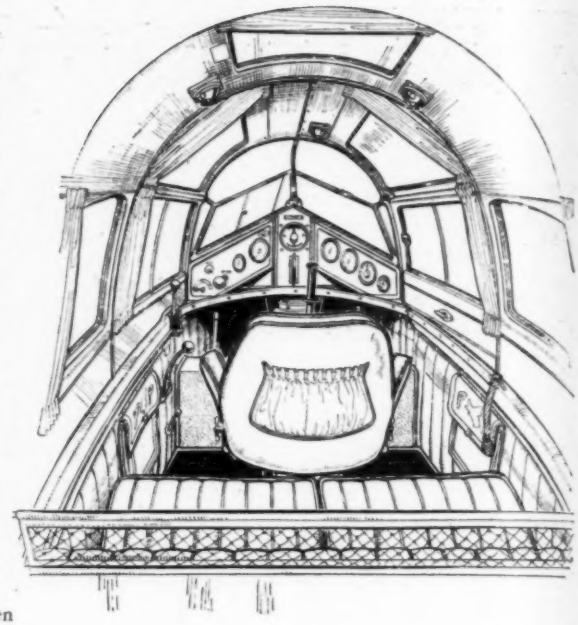
The Miles Falcon, a four-seater cabin version of the Major, was first produced with a Gipsy Major engine, in which form it cruised at 125 m.p.h. Later, the fitting of the Gipsy Six as an alternative power unit raised this speed to 155 m.p.h. or more, and a three-seater version of this machine won last year's King's Cup and broke both the out and home Cape records in the hands of Flt. Lt. Rose. The Falcon has a number of interesting control features, including the hydraulically operated flaps and a central control column between the two front seats (when these are so arranged), and a special five-seater charter version, known as the Merlin, has put in good work both here and in India. The Night Hawk is a special trainer for night and blind flying, based on the Falcon.

The specification of the standard Falcon is as follows: Weight empty, 1,300lb.; disposable load, 900lb.; span folded, 15ft. 10in.; length, 25ft.; maximum speed, 145 m.p.h.; cruising speed, 125 m.p.h.; landing speed, 44 m.p.h.; range, 615 miles.

The Hawk Major was the first high-performance private-owner type to be put into general production, and is an open two-seater which, with a Gipsy Major engine, cruises at something rather better than 130 m.p.h. Derived from the standard model, the Hawk Trainer has a slightly greater span and wider cockpits to accommodate the variegated equipment necessary in modern training machines, and this machine is also produced as a rather more luxurious private-owner type. The Trainer, incidentally, took second and third places in last year's King's Cup race.

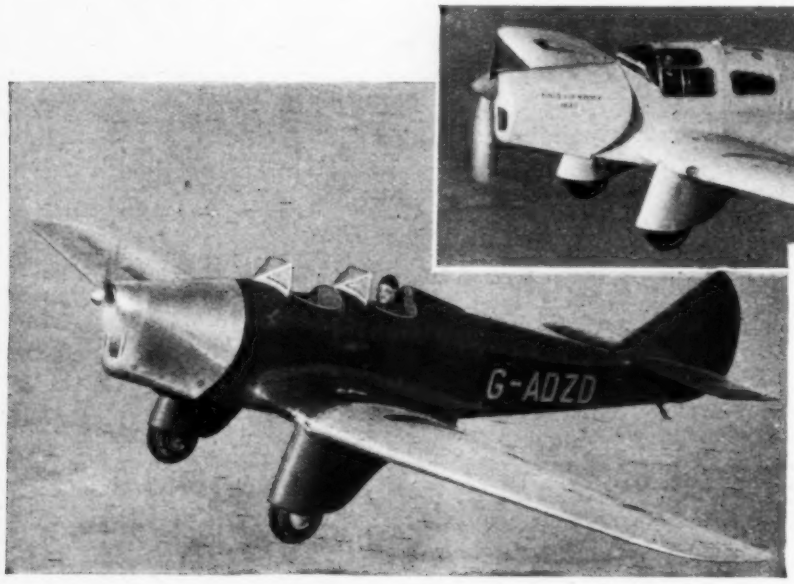
Designed by Mrs. Miles for the King's Cup, the Miles M.5 is similar in many respects to the Major, but the wings do not fold and the undercarriage is wide enough to be well clear of the slipstream. This machine, which is reputed to be one of the most pleasant in its handling qualities, will be a two-seater in its production form. During the eliminating race Mr. Miles averaged more than 160 m.p.h., including stops, in this machine

The new Peregrine lies somewhat outside the light aeroplane category. This machine has already been described in *Flight*, but it is now possible to publish a drawing of the interior, which appears on p. 449.



In its three-seater form the pilot of the Miles Falcon—in this case the Gipsy Six model—is seated centrally. As a four-seater the third passenger sits beside the pilot, who has the control column on his right. The arrangements for passengers and luggage are shown in the diagram.

The specification of the Hawk Major is as follows: Weight empty, 1,150lb.; disposable load, 750lb.; span folded, 13ft. 10in.; length, 24ft.; maximum speed, 150 m.p.h.; cruising speed, 135 m.p.h.; initial rate of climb, 1,300 ft./min.; landing speed, 42 m.p.h.; endurance, 4.5 hr. Makers: Phillips and Powis Aircraft, Ltd., Woodley Aerodrome, Reading.



The machine shown on the left is the Hawk Trainer, which differs only in detail from the standard Major. On the right is the Falcon Six—actually the King's Cup winner being flown by Flt. Lt. Rose himself.

MONOSPAR

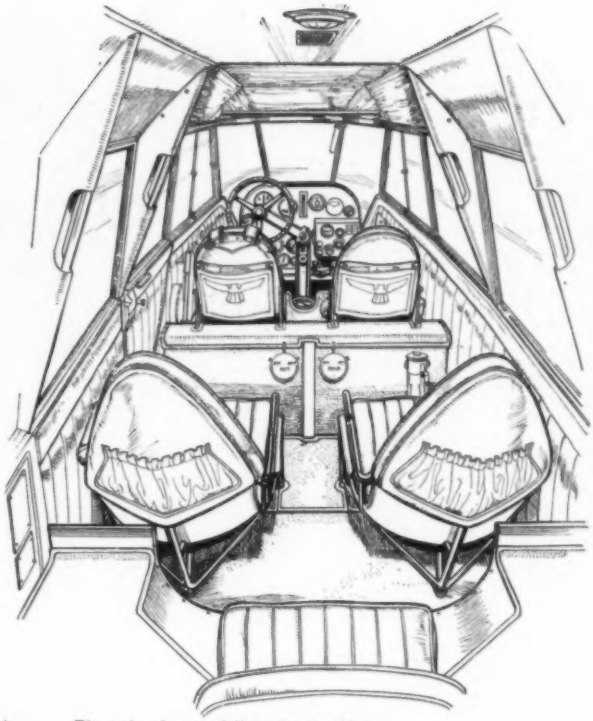
LAST year's S.T.25 was produced in its standard form with full day- and night-flying equipment as well as a radio homing and receiving set. This year the same principle has been expanded to provide five separate types for different purposes, in each of which the equipment has been standardised to suit these five purposes.

The new De Luxe model may be taken as typical of the range, since it incorporates most of the features which are found on the 1936 machines, such as trimming tabs, electric engine starters and a redesigned dashboard layout in which the R.T.E. homing receiver is within easy reach of the pilot, and all the electrical switchgear is mounted on a single panel or box. Structurally, the S.T. 25 remains unaltered, and it will be remembered that this is all metal and involves the well-known Monospar system of construction, by which the structure weight can be kept down to a minimum.

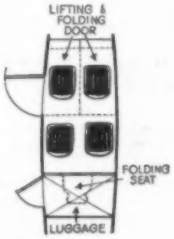
The trimming tabs on the elevator and rudder are operated by small and convenient levers which require no effort, and the whole business of flying the new Monospar is reduced to one of mere flying judgment. Its characteristics are interesting and soon mastered, and the pilot, in particular, has a very excellent, and consequently safe, field of view. In common with most low-wing machines, it is possible to adjust the approach by increasing or decreasing the gliding speed, and really short approaches can be made by a pilot who is thoroughly accustomed to the machine. Once it is firmly on the ground the Palmer brakes can be applied to their fullest extent without risk of nosing over, and full control is retained right down to the stall, which is harmless enough if the rudder is not maltreated.

In Europe, paricularly, the radio homing equipment would be very useful and, even if this cannot be used in this country on every flight, there is always the regular and valuable Air Ministry meteorological broadcast from Borough Hill to be received. The electrical equipment of the Monospar, incidentally, includes landing and navigation lights, instrument and cabin lighting, as well as electric starters on certain models, as already mentioned.

The General Aircraft Company have specialised in the production of carefully worked-out running-cost schedules for the benefit of air-line operators and others who are interested in the Monospar as a dividend-earning machine. A series of these have been published in booklet form. Incidentally, the company has evolved an economical hire scheme which includes the services of a "B" licence pilot.



There is plenty of light in the Monospar cabin and the machine can be flown from either of the two front seats. When used as a four-seater that in the foreground folds away, leaving a wide shelf for luggage which can be reached, if desired, through a separate door. The De Luxe model is shown in the air on the left.



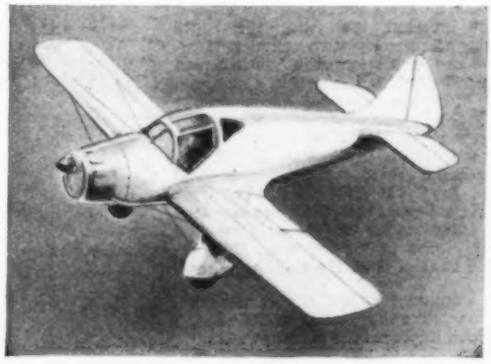
The specification of the De Luxe Monospar is as follows: Weight empty, 1,758lb.; disposable load, 1,117lb.; span folded, 14ft. 10in.; length, 26ft. 4in.; cruising speed at 3,200 r.p.m., 123 m.p.h.; duration at cruising speed, 3.8r hr.; initial rate of climb, 700 ft./min.; price, £1,985. Makers: General Aircraft, Ltd., London Air Park, Feltham, Mddx.

MARENDAZ

BRITISH car manufacturers are particularly skilful in building that mose desirable vehicle, the sports saloon. That, in fact, is the designation one might give to the Marendaz two-seater cabin monoplane now being built to the designs of Mr. D. M. K Marendaz, known to motoring enthusiasts as the designer and manufacturer of the Marendaz Special cars.

Mr. Marendaz claims that the semi-monocoque fuselage of his monoplane—which will have side-by-side seating—will provide accomodation equal to that in an Austin Seven car. The engine is likely to be a Pobjoy, conferring a maximum speed of 138 m.p.h. Flaps, landing light, differentially operated brakes and undercarriage springing by torsion shaft will be standard features, and the price, completely equipped, will be £650. The machine has been designed to conform with the Air Ministry's aerobatic requirements.

The main data are: Span, 28ft.; length, 21ft. 5in.; weight empty, 821lb.; disposable load, 550lb.; cruising speed, 120 m.p.h.; landing speed, 45 m.p.h.. Makers: Marendaz Special Cars, Maidenhead, Berks



A two-seater cabin machine now in the process of being built—the Marendaz, which is likely to be fitted with a Pobjoy engine.

PARNALL

DESIGNED by Mr. Basil B. Henderson, the original Heck was produced rather more than a year ago, and proved itself a very interesting aeroplane with a high top speed and a very wide speed range. This was attained by the use of leading edge slots and slotted trailing edge flaps. It may be recalled that last November Mr. David Llewellyn and Mrs. Wyndham clipped nearly 19 hours off the existing record for a flight from Capetown to England, thus proving the merits of the Heck.

After an amalgamation of interests, Parnall Aircraft, Ltd., of Yate, Glos, now have the production of the Heck in hand. The new model differs in certain minor respects from the prototype, although all the essential features have been retained. The fuselage has been lightened slightly and instead of the retractable undercarriage of the original machine the production model will have a streamlined pure cantilever undercarriage and castering self-centring tail wheel by Dowty.

The original Heck, in which Mr. Llewellyn and Mrs. Wyndham lowered the Cape-England record by over eighteen hours last November.

The leading edge slots are automatic in action, but the trailing edge flaps are operated by the pilot. A very neat mechanism is incorporated, by which the inner flaps move down through a greater angle than that through which the aileron flaps move. The ailerons, of course, retain their differential action when moved down to increase lift. With flaps down the approach angle is quite steep, and the landing speed relatively low.

For the present, performance figures relating to the production Heck cannot be given, but it may be recalled that the prototype did rather better than 170 m.p.h. One may assume that the new type will have approximately the same speed. The landing speed of the original was in the neighbourhood of 40 m.p.h., so that the speed range exceeded 4 to 1. Over a measured course the machine was timed at an average speed of 44.8 m.p.h. without loss of height, i.e., in horizontal flight, thereby demonstrating beyond any possible doubt the effectiveness of the slots and flaps in increasing the maximum lift while still retaining full controllability at very low speeds.

Structurally the new Heck follows exactly the principles used in the prototype. Wood is the chief material, and the expert woodworkers of Parnall Aircraft, Ltd., have made a very excellent job of the machines which *Flight's* representatives saw in course of production at Yate a short time ago. The workmanship is excellent and the finish as good as anything to be found anywhere.

It may, perhaps, be recollected that in the original Heck the cabin was entered "over the top," via the hinged windows. The new machine has a more orthodox door.

Final details of the cabin layout of the production Heck were not available when *Flight* went to press with this issue, but normally the machine will seat pilot and two passengers, although it is possible that for purchasers who desire a four-seater, such accommodation may be provided.

The Heck will be available with two power plants, the Gipsy Six and the Wolseley Aries. The fittings on the corners of the engine bulkhead are arranged to take either the Gipsy or the Aries engine mountings without alteration.

Makers: Parnall Aircraft, Ltd., Yate, Glos.

POU-DU-CIEL

EVOLVED by a Frenchman, M. Henri Mignet, the *Pou-du-Ciel* differs from other aircraft in that it has no ailerons for lateral control. The large dihedral of the wings gives the machine a pendulum action so that when the rudder is moved the machine automatically banks to the degree appropriate to the turn. The rudder is operated by moving the control stick from side to side, and the front wing is pivoted so as to have a variable angle of incidence; this takes the place of the elevator of the orthodox aircraft and is operated by moving the control stick forwards and backwards. The feet are not used at all in controlling the *Pou*.

Although the *Pou-du-Ciel* was originally designed for amateur construction, and large numbers have been so built, several firms supply the machine complete, ready to fly. It is also available with different power plants, such as the water-cooled Carden, the Aero Douglas flat twin, the British Anzani inverted vee twin, the Scott "Flying Squirrel" two-cylinder two-stroke, and, just lately, the Austin Seven engine adapted to *Pou* work.

One firm which makes the complete *Pou* is the Putnam Aircraft Co., of 407, Hornsey Road, Holloway, London, N. Their machine is fitted with the Carden four-cylinder water-cooled engine and sells at £175. It differs somewhat from the original machine. For instance, the front wing has its leading edge covered with plywood up to the spa. The incidence control is of the rigid type, and the rudder controls are taken direct to kingposts on the rudder. In addition to the standard instruments, an oil pressure gauge and a radiator thermometer are fitted.

Aircraft Constructions, Ltd., of Sidcup, Kent, supply all parts and also the complete machine. When fitted with the British Anzani engine the price of their complete machine is £157 10s.

Abbott-Baynes Aircraft (a branch of E. D. Abbott, Ltd.), Farnham, Surrey, have an improved type coming through, but, unfortunately, are not quite ready to disclose details.

Anything from a nut to the complete machine is also supplied by Purkess Light Aircraft, Ltd., of 204, Ballards Lane, Finchley, London, N.3, and complete parts can be obtained from Snellings Light Aircraft Service, 404, Blackburn Road, Darwen, Lancs, who are also distributors of the Anzani engine.

The Putnam *Pou-du-Ciel* with Carden engine. Note the window in the wing, which improves the view upwards.

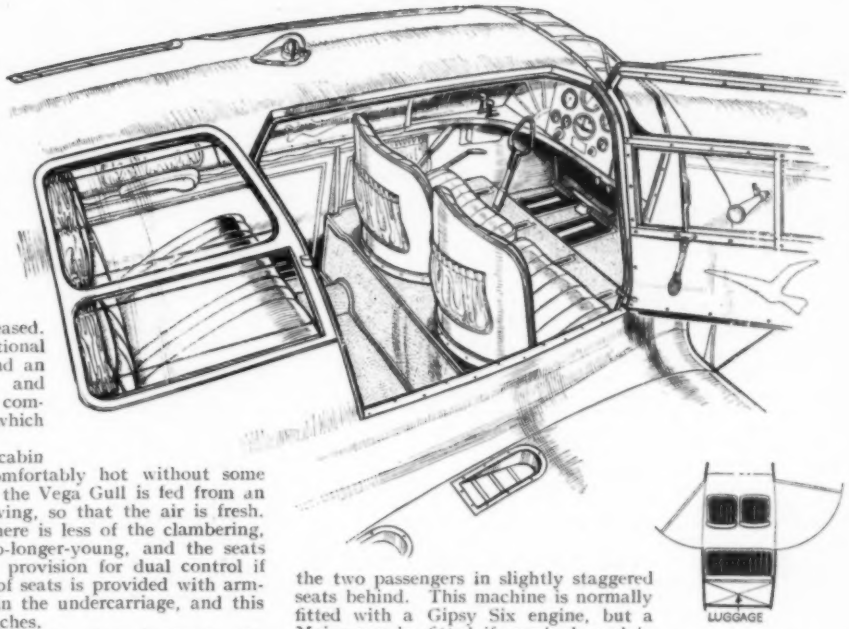
On the left is the standard Gull, while below is a sketch of the cabin accommodation of the new four-seater Vega Gull. There is, as will be seen, ample room, and the luggage is stowed in a compartment at the rear of the cabin. The seating plan indicates the very useful width of the two doors.

PERCIVAL

LATEST of the Percival Gull series, the Vega Gull may be described as an enlarged Gull, though the comparison does not end there. It is both scaled-up and cleaned-up, and carries four people in considerable comfort at a speed barely 5 m.p.h. lower than that attained by the standard three-seater. An increase of wing area has kept the landing speed down to the same figure as before, and the area of the split flaps has been increased. Electric starters are an optional fitting, as are a cabin heater and an R.T.E. homing equipment, and luggage is carried in a separate compartment, behind the cabin, which is reached from the outside.

The majority of low-wing cabin machines tend to become uncomfortably hot without some form of ventilator, and that on the Vega Gull is fed from an aperture well outboard in the wing, so that the air is fresh. Two doors are fitted, so that there is less of the clambering, which is so irritating to the no-longer-young, and the seats are arranged in two pairs with provision for dual control if this is required. The rear pair of seats is provided with arm-rests. Cleaning-up is apparent in the undercarriage, and this has a travel of more than six inches.

In the case of the Gull the pilot sits alone in front with the two passengers in slightly staggered seats behind. This machine is normally fitted with a Gipsy Six engine, but a Major can be fitted if required, and in this case the cruising speed is 133 m.p.h., against the 155 m.p.h. of the normal type.



Capt. E. W. Percival inspects the flaps of the Vega Gull.

The specification of the Vega Gull is as follows: Weight empty, 1,575lb.; disposable load, 1,175lb.; span, 39ft. 6in.; length, 25ft. 6in.; maximum speed, 170 m.p.h.; cruising speed, 150 m.p.h.; stalling speed, 45 m.p.h.; range, 620 miles; price, £1,550.

Although the prospective market must necessarily be small, the Mew Gull should appeal to those experienced private owners who require really fast and yet comfortable transport for one and one's luggage. Capt. Percival appears to use it himself for quite normal travel.

The specification of the Mew Gull is as follows: Weight empty, 1,080lb; disposable load, 720lb.; span, 24ft.; length, 20ft. 3in.; maximum speed, 225 m.p.h.; cruising speed, 190 m.p.h.; landing speed, 58 m.p.h.; initial climb, 1,400 ft./min.; range, 750 miles. Makers: Percival Aircraft Co., 20, Grosvenor Place, London, S.W.1.

PERMAN

IT is something like ten years since there was a parasol monoplane on the British market, and, since the type offers a number of advantages—mainly of a practical rather than an aerodynamical nature—the arrival of an up-to-date version will be watched with interest.

The parasol layout has been chosen by E. G. Perman and Co., of 24-25-26, Brownlow Mews, Gray's Inn Road, London, W.C.1 (well known as *Pou-du-Ciel* constructors), for the single-seater monoplane which they will be marketing in a few weeks' time at a price which, it is hoped, will be under £200. The construction will be a sturdy one of plywood on a wooden framework.

Of 25ft span, and with an overall length of 15ft., the machine will have the Perman "Poupower" four-cylinder water-cooled engine, which develops 31 h.p., and the designer is confident of a high performance.

Messrs. F. W. Broughton, F. Graves and A. Parrish are the team responsible for the design.

SHORT SCION

PRIMARILY designed and in use as a feeder-line and charter machine, the Short Scion is possessed of a number of features which should make it an admirable luxury private-owner type. With the safety of two engines and with adequate space for two-way radio equipment, the Scion might be considered as an ideal for this type of owner who, nevertheless, wants to fly himself on occasion. It is easy to handle and has been described more than once as an excellent machine for graduation to the twin-engined type. The forward view is nothing less than magnificent, and the pilot is near enough to the ground to make a landing easy to anyone who is accustomed only to the normal single-engined cabin machine.

As a transport machine the Scion has five seats in addition to that of the pilot, though another can be arranged with a corresponding reduction in range, but there is plenty of room in the cabin for any normal re-arrangement of seating for different private purposes. Controllable heating and ventilation systems are standardised, and the high-wing cantilever arrangement gives both passengers and pilot the best possible view of the ground.

Very complete electrical equipment is installed as standard and includes a generator, battery, navigation instrument and cabin lights and a head light, in the extreme nose, for landing. Electric engine starters are also regarded as standard items.

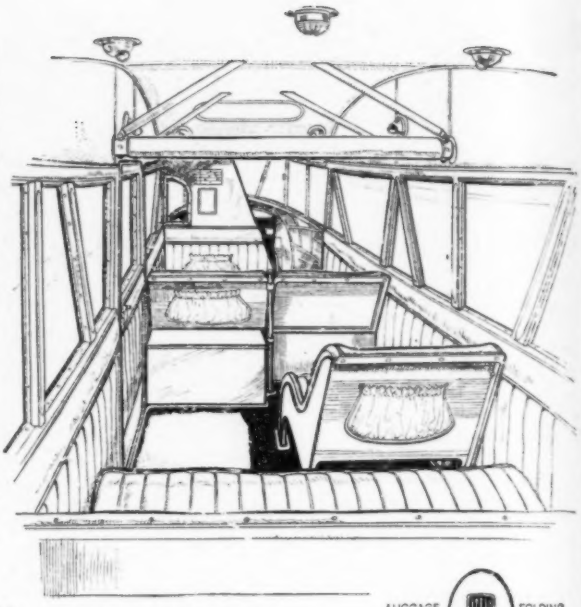
Each of the engines has its own petrol and oil systems, but the engine pumps are interconnected so that in the event of a pump failure both engines are supplied by the remaining pump.

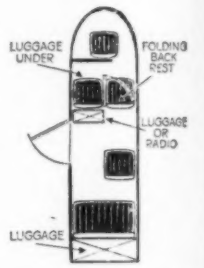
The Scion is largely of metal construction, with the wing built up round a single duralumin box spar with duralumin ribs, while the fuselage is of fabric-covered welded steel tube. The 90 h.p. Pobjoy Niagara engines are enclosed in low-drag cowlings and the undercarriage fittings are designed to take a twin-float chassis if desired.

The land undercarriage embodies low-pressure wheels with differentially controlled pneumatic brakes and friction-damped spring shock absorbers. When floats are fitted the entire undercarriage is of Short design and construction. It is highly efficient hydrodynamically and offers far less resistance than might well be supposed. Actually it decreases the top speed by only 6 m.p.h.

Structurally the frames of the floats consist of a number of frames or bulkheads built to the required shape, to which the outer skin is riveted, the skin being stiffened between the frames by "Z" type stiffeners. The planing bottom is stiffened by a keel and side keelsons, additional stiffening being incorporated at highly stressed points. Stainless steel is employed for such items as strut attachments.

The sole building and sales rights for the Scion are held by Pobjoy Airmotors and Aircraft, Ltd.; the Scion Senior, which may be regarded as a four-engined, scaled-up version, is, however, still a product of Short Bros.





The Short Scion is normally equipped with four passenger seats, one of which swings out of the way to permit entrance to the pilot's compartment, but this arrangement can be modified to suit the purchaser. A radio set, when carried, is mounted behind the left-hand forward seat and there is a separate luggage compartment.

The specification of the Scion is as follows: Weight empty, 1,875lb.; disposable load, 1,325lb.; pan, 42ft.; length, 31ft. 6in.; maximum speed, 128 m.p.h.; cruising speed, 116 m.p.h.; landing speed, 50 m.p.h.; initial climb, 625 ft./min.; range, 300 miles; price, £2,250. Makers: Pobjoy Airmotors and Aircraft, Ltd., Rochester, Kent.

SARO CUTTY SARK

IT has often been a source of wonder that more amateur pilots have not interested themselves in the seaplane, and, to particularise, in the small amphibian. The fact that there is only one type of amphibian on the British market is neither here nor there, since the demand would automatically have produced the supply in due course. The performance of the amphibian must naturally be down on the straightforward machine, both in the matter of payload and speed, but one or two recent designs have shown us that the difference need not be so very great.

However, for the present the Saro Cutty Sark—or, perhaps, the larger Cloud—are the only machines of this type available, and each of these has been on the market for a number of years. Naturally, if the demand was present, Saunders-Roe could now improve considerably on these designs. So far as we know, only two Cutty Sarks are in use in this country, though the Cloud has been adopted by the Air Ministry for training purposes. The former, fitted with two Gipsy Major engines, has, however, been adopted by a foreign Government for coastal reconnaissance duties, and in this form the Sark has a very good performance.

The cabin seats four in two pairs, while there is a luggage compartment under the cantilever wing and the locker in the nose for nautical gear. Dual control can be fitted, and the two centre panels of the screen hinge back to obtain access to the forward compartment and to enable one of the crew to deal with moorings, and so on.

The specification of the Cutty Sark when fitted with two Gipsy Major engines and when equipped as an amphibian is as follows: Weight empty, 2,670lb.; disposable load, 1,180lb.; span, 45ft.; length, 34.3ft.; maximum speed, 107 m.p.h.; cruising speed, 90 m.p.h.; initial climb, 500 ft./min.; endurance, 3.5 hr. Makers: Saunders-Roe, Ltd., East Cowes, Isle of Wight.

This particular Cutty Sark is that used for training by A.S.T. at Hamble, and is fitted with Siddeley Genet Major engines.

Modern Light Aircraft Reviewed—(Cont.)

FOREIGN MACHINES on the BRITISH MARKET

Three Makes and their Concessionaires

BEECHCRAFT

THE aerodynamic and structural efficiency of the American Beechcraft Model B-17-L (probably the best-selling Beechcraft type) can be conveniently expressed as: Four seats, 225 h.p., cruising speed 152 m.p.h. It is probably the most unorthodox machine on the market so far as lay-out is concerned and might appear to the uninitiated to be a real "handful" in the air.

Actually it is quite docile and is in wide, every-day employment. A flying trial by *Flight* some time ago revealed less lateral and longitudinal stability than is found in most American machines, but excellent manœuvrability, as might be expected from the compact biplane arrangement. The wide undercarriage retracts quickly into a space beneath the cabin floor, being actuated by compressed air from the Heywood starter system. The drag of the lowered undercarriage in conjunction with the split flaps confer a steep gliding angle and a normal landing speed. Comfort and good outlook are further qualities.

The Beechcraft, though at first glance somewhat odd in appearance, has some excellent features as well as a good performance.

Structurally the machine exhibits few abnormal features; the wing framework is of wood and the fuselage of steel tubing.

In this country the agent is Mrs. Amy Mollison, who keeps a demonstration machine, mounting a Wright Whirlwind engine, at Croydon. There are various other attractive Beechcraft "lines," including the B-17-R (420 h.p. Wright; maximum speed 201 m.p.h.) and the A-17-R (700 h.p. Wright; maximum speed 250 m.p.h.).

The main data applying to the B-17-L are: Weight empty, 1,600lb.; disposable load, 1,550lb.; span, 32ft.; length, 24ft. 5in.; maximum speed, 175 m.p.h.; landing speed, 45 m.p.h.

CESSNA

THERE are some aeroplanes which, although apparently conventional in construction and design, exhibit some agreeably surprising performance and weight-lifting qualities. In this category comes the Cessna C-34, an American machine which is now being handled in this country. It has done extremely well in certain American competitions intended to ascertain the general efficiency of machines in its class.

In appearance the machine is neat and pleasing. It is a four-seater monoplane with a high cantilever wing and a divided cantilever undercarriage. The fuselage is a welded steel tubular structure, but the wing, which has trailing edge flaps, is of wood. In the cabin, beneath the wing, are seats for four, in two pairs, with dual controls for those in front. There is a door on each side and a baggage compartment behind the rear seats. A 145 h.p. Warner Super-Scarab seven-cylinder radial is the standard power unit.

The main data are: Weight empty, 1,220lb.; disposable load, 980lb.; span, 33ft. 10in.; length, 24ft. 7in.; maximum speed, 162 m.p.h.; cruising speed, 143 m.p.h.; initial rate of climb, 1,000 ft./min. The agents in this country are: Surrey Flying Services, Ltd., Airport of London, Croydon, Surrey.

The latest Stinson Reliant, which has a gull-type wing of unusual design and has lost the angular appearance of the previous models.

STINSON

A YEAR or two ago certain of the more pecunious private owners in this country became highly enthusiastic over a four-seater Stinson Reliant monoplane imported from America. What appealed particularly to them was the high finish and the determined attempt which had been made to provide the "motor-car comfort" about which so much loose talk was rife at that time. Subsequently other Stinsons appeared over here and are still giving satisfactory service.

The latest model of the Reliant differs in a number of important respects from these familiar machines. It is available in "special" and "standard" forms, incorporates a metal gull-type wing of unusual design, and has slotted vacuum-operated flaps. The Hamilton variable-pitch airscrew is specified both for the 225 h.p. Lycoming engine of the standard model and the 245 h.p. Lycoming of the "special" version.

Certainly, in the form in which it has so far appeared in this country, the finish and general equipment of the Reliant should have given our manufacturers something to think about—though these features are not the be-all and end-all of light aeroplane design. Furthermore, the Reliant is not quite a "light aeroplane" in our sense of the term, and one can do a very great deal with a matter of 250 h.p. to carry four passengers and their luggage.

In the air the 1935 Reliant was the most docile of machines, and it can only be presumed that the new model is even better. The flaps were efficient enough to allow the pilot almost to point the machine at the aerodrome boundary during the approach without gathering too much speed, and the v.p. airscrew—the only feature of the control system which was strange to British hands—was very easily managed. It goes without saying that the engine was smooth and the cabin quiet.

The abridged specification of the standard Reliant (Model SR7-A) is: Weight empty, 2,260lb.; disposable load, 1,115lb.; span, 41ft. 7in.; length, 26ft. 8in.; maximum speed, 148 m.p.h.; cruising speed, 138.5 m.p.h.; landing speed, 48 m.p.h.; cruising range, 470 miles. The agents in this country are: Brian Allen Aviation, Ltd., Airport of London, Croydon, Surrey.

THE FOUR WINDS

ITEMS OF INTEREST FROM ALL QUARTERS

THE ONCE-OVER: Colonel Lindbergh inspects the B.A. Eagle prior to making his first flight since he came to England. A paragraph on this page tells of his visit to Hanworth.

PRINCE CHARLES, Count of Flanders, and brother of King Leopold, is a major in the Belgian military air service. On taking up his duties recently he flew in a Fairey Fox, a standard military reconnaissance-bomber.

Two Bristol Mercuries are specified for the new Koolhoven 200 m.p.h. bomber.

Mr. Gordon Armstrong has built Ceylon's first *Pou*. The structure is of Ceylonese wood.

United Air Lines employ more than a hundred stewardesses. One has flown over 400,000 miles.

The Zeppelin *Hindenberg* will leave for her first North Atlantic voyage (to Lakehurst) on May 6.

The catapult ship *Ostmark* for Lufthansas' South Atlantic service has just been launched.

She is 290ft. long, is of 2,000 tons displacement, and carries a Heinkel catapult.

Mr. J. Melrose reached Singapore in his Heston Phœnix at 9.30 on Monday and expected to reach Batavia by the evening.

The world's altitude record for amphibians has been broken by the Sikorsky S.43 (two 750 h.p. Hornets), which reached 27,950 feet.

A squad of twenty doctors and nurses equipped with parachutes has been formed by the Moscow Red Cross to render aid in isolated areas.

An air rally is to be held at Salisbury, Southern Rhodesia, in August. It is expected that contingents from the Royal Air Force and South African Air Force will attend.

Indoor Archies

The Royal Tournament opens at Olympia on May 7. It will include an "air raid" during which Territorial anti-aircraft guns and searchlights will be brought into action.

Aviation at Levant Fair

Palestine is getting air-minded. At the forthcoming Levant Fair in Tel Aviv aviation will be given much greater attention. Manufacturers of gliders particularly are advised to study the Near Eastern market.

The Danish Gauntlets

Since last year, when the Danish air force acquired the licence to build the Gloster Gauntlet, the drawings and a sample machine have been received from England. The first production model is now ready and seventeen similar machines will be forthcoming at short intervals.

The Way of an Eagle

Colonel Lindbergh last week used for the first time the pilot's licence recently granted to him. During a private visit to the works of the British Aircraft Manufacturing Co. at Hanworth he was taken up in an Eagle by Mr. Ralph Munday, the company's sales manager. Subsequently he went solo.

To Try Again

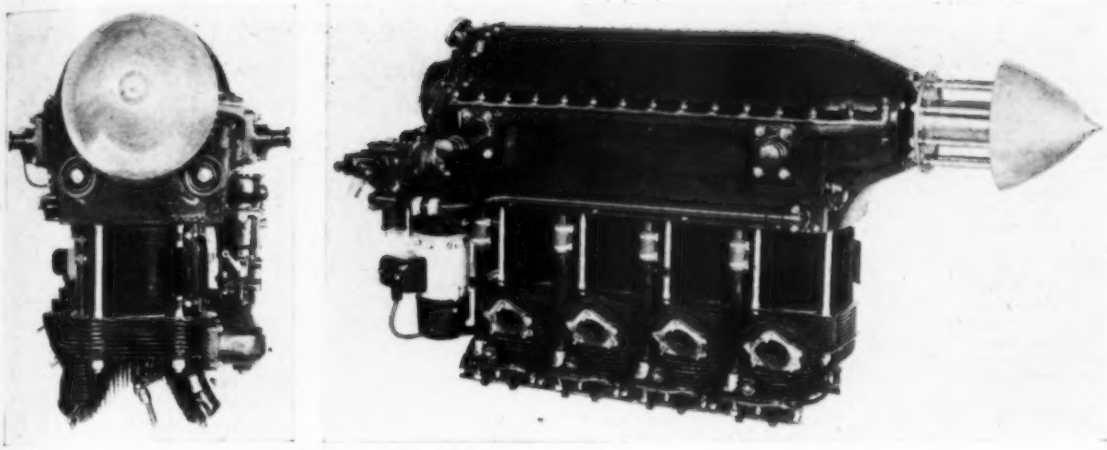
Mrs. Amy Mollison left Gravesend for Colomb Bechar on Sunday in a Dragon. The machine is carrying Mrs. Mollison's sister, Mr. P. Q. Reiss, and a mechanic, in addition to a new undercarriage for her Gull, which was damaged during her recent Cape record attempt. Mrs. Mollison hopes to bring back the Gull to England and try again early in May.

Twenty-five Years Ago

(*From "Flight" of April 22, 1911.*)

"Truly it can be said that aviation history is being made at a marvellous rate. . . . 1911 is likely to be remembered as the year in which Pierre Prier improved on the records by flying non-stop from London to Paris . . . that it should be possible for an aviator to set off at practically a moment's notice on a journey of 250 miles is an extraordinary commentary on to-day's progress."

JAPANESE—WITH A TWANG: This Nakajima biplane carries the night mail between Tokyo and Osaka. Its cruising speed is about 120 m.p.h.



A NEW BRITISH "FOUR"

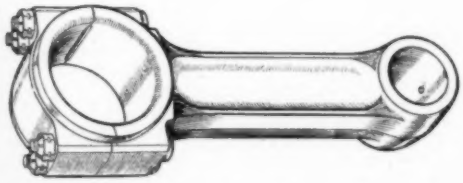
The Amherst Villiers Maya : 120/130 h.p. : One Thousand Hours Contemplated Between Major Overhauls

BUILT to the designs of Mr. Amherst Villiers by Villiers Hay Development, Ltd., of 48, Albemarle Street, London, W.1, the Amherst Villiers aero engine type 4-L-318 is an air-cooled, inverted four-in-line type designed to run 1,000 hours between major overhauls. It will be rated at 120 h.p. at 2,300 r.p.m. and deliver a maximum of 130 h.p. at 2,600 r.p.m. for a weight of 275 lb.

Apart from the small frontal area, the makers claim that the chief feature is the cooling of the cylinder heads and valves by the use of a hemispherical combustion chamber with widely splayed valves similar to those normally incorporated on radial engines. The barrels have deep, closely pitched fins.

The engine has undergone weak-mixture and full-throttle tests under Air Ministry supervision and has been type-approved in the special category for flight tests. All tests were made with the assistance of Mr. Knee, of the Airwork Engine Service Department, Heston.

The cylinders are machined all over by the Mollart Engineering Co. from 55-ton carbon steel forgings supplied by Samuel Fox and Co., Ltd. It is claimed that the deep, fine-pitched fins, by effecting a reduction in piston temperatures, reduce the tendency towards gummed piston rings, carbon formation, etc.



The connecting rods are of sturdy proportions and are of R.R. 56 alloy.

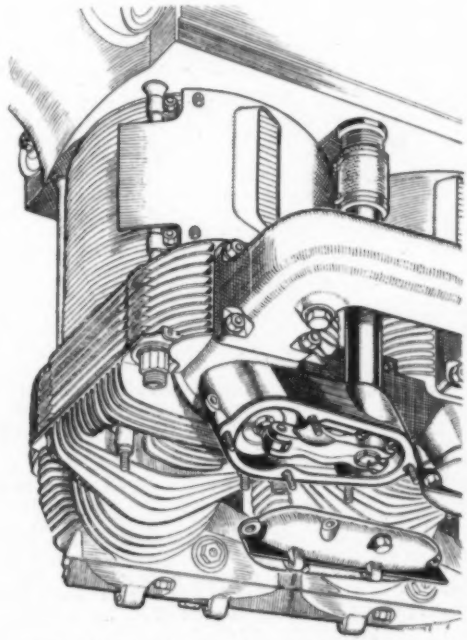
Heat-treated "Y" aluminium alloy supplied by Hepworth and Grandage, Ltd., is used for the pistons, which incorporate three Brico compression and two scraper rings of the butt-joint type. The fully floating gudgeon pins are of large diameter.

The connecting-rods are of light alloy (R.R.56) and of heavy section. They are hot-pressed by High Duty Alloys, Ltd. Four bolts at the big-end clamp the steel shells lined with Glacier white metal.

The crankshaft is integral with the airscrew hub and has five precision-ground main bearings with a deep-groove Hoffman ball journal bearing to take the airscrew thrust. It is machined all over by Ambrose Shardlow, Ltd., from Samuel Fox and Co.'s Diamet-inspected, electrically melted nickel-chrome molybdenum steel forgings. All bearings are of large diameter and are blended with the crank cheeks by large radii. At the rear end are the separately flanged and bolted timing gear and a starter dog.

Sturdy Elektron castings (supplied by Sterling Metals, Ltd., and machined by Ryder and Davidson) are used for the crankcase. The top cover is an Elektron casting which can be easily removed in a few minutes without dismantling the rear cover or accessories.

Heat-treated aluminium alloy (R.R.53) castings by High Duty Alloys, Ltd., are used for the cylinder heads. The



The somewhat unorthodox cylinder heads and valve gear are visible in this sketch made from the intake side. Note how the push rods are placed between the cylinders.

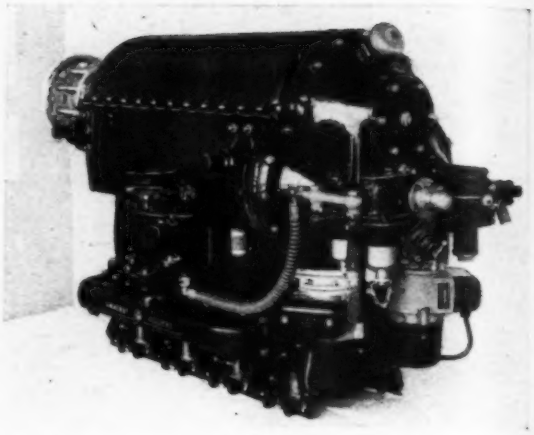
widely splayed valves allow a generous bridge of aluminium between the valve inserts, thus reducing stresses and the consequent danger of cracking. The valve inserts are machined from steel forgings (machined and supplied by the Harold Andrews Grinding Co., Ltd.), have stellite seats, and are shrunk into the head with the use of liquid oxygen.

There are two camshafts of nickel-chrome case-hardened steel supplied by the E.M.V. Engineering Co., Ltd. They are mounted one on each side and run on four bearings directly on the Elektron case, which is said to have excellent bearing properties. The push-rods have tubular casings and are operated *via* roller tappets and large-diameter ball ends. These are situated on either side of and between the cylinders. The rockers (supplied by Hughes Johnson Stampings, Ltd., and machined by William Spears, Ltd., of Leicester, in 65-ton nickel-chrome steel) are positioned fore and aft and mounted on special Timken taper roller bearings to take the side thrust. In the six-cylinder engines being developed by the Company the push-rods of each cylinder are orientated slightly outwards, while the rockers are splayed backwards and outwards in order to reduce this thrust still further. Each cylinder has one inlet and one stellited exhaust valve (supplied by Motor Components (Birmingham), Ltd.), the latter valve having a large-diameter stem and a solid-rimmed head to avoid distortion.

One pressure and two scavenge oil pumps, of the gear type, are housed in an accessible unit at the back of the crank case, being driven direct from the starboard camshaft. The oil pressure is 40-60 lb. per square inch.

There are two 14 mm. K.L.G. or Lodge plugs per cylinder. The two B.T.H. spigot-type magnetos have automatic advance and are driven at camshaft speed. The distributors can be screened at the purchaser's option.

One Claudel Hobson A1 48-DX downdraught carburetter is fitted on the port side and has independent altitude control.



This three-quarter rear view shows such items as carburetter, fuel pumps, magnetos, etc.

An Amal duplex fuel pump is driven direct from the end of the port camshaft.

Various parts and bolts have been supplied by Rubery Owen and Co., Ltd., and Brown Bros., Ltd., and the jointings are by James Walker and Co., Ltd.

The dimensions of the engine are: length overall without starter or spinner, 43⅜in.; overall height, 22¾in.; overall width, 15⅞in.

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters intended for inclusion in these columns.

LETTING THE CLUB PILOT OFF THE LEASH

AFTER some experience on a B.A.C. Super Drone I should like to suggest to "Indicator," "Five Hundred Hours," and flying clubs that a modest single-seater of this type provides a reasonable method of letting bored, inexperienced and impecunious club pilots off the leash.

It is surprising how a good gliding angle, all-round view, and half the usual landing speed, reduce the terrors of a forced landing, and it is also comforting to feel that these views are shared by the insurance company, and that landing in ordinary fields is permitted.

My second cross-country flight on the Drone, after ten hours' solo on other types, was to Paris, and a more recent purchaser, Mr. Scott-Pearse, with fifteen hours' solo to his credit, left Hanworth one evening and reached Perth the next. [Since the above was written a Drone has flown to Berlin.—ED.]

Neither of us would have cared to be burdened with the responsibility of a passenger, and the petrol required for either journey would have barely sufficed for circling the aerodrome on the usual club aeroplane. JOHN S. DOVE.

"EGGS AND BASKETS"

IT would appear that the statement contained in a recent leading article in *Flight* to the effect that "the Admiralty has persisted in setting store by carriers," contains a criticism which is not strictly justifiable.

What the Admiralty has done is to realise the value of aircraft to the Fleet, but it is difficult to see how it can be blamed because the aircraft supplied require floating aerodromes from which to operate.

The catapult method of launching aircraft has solved part of the problem; but even so, and under ideal conditions, recovery from the water is anything but an easy matter, and one which in wartime might prove to be impracticable.

It appears rather strange, therefore, that whilst certain alternatives to the aircraft carrier are suggested in the article, one of which is the possible suitability of airships for the patrol of ocean trade routes, no mention at all is made of the possibilities of the Autogiro for this and other duties for which it appears to be particularly suited.

Practical tests carried out for the Italian Navy fifteen months ago showed that a perfectly standard Autogiro could not only fly off from, but what is equally as important, also land on, a small platform erected on a cruiser. The experiments were carried out under various conditions ranging from ship stationary to twenty-four knots, and the results obtained provided further proof of those unique qualities of adaptability and utility possessed by this type of aircraft.

The only logical solution to the problem of how most advantageously to arrange the eggs amongst the baskets is that means which will enable every ship to become its own independent aircraft carrier; and it is suggested that for purely naval duties the Autogiro will prove to be the only type of aircraft which will enable this ideal to become a reality.

Twickenham. R. A. C. BRIE.

AUSTRALIA'S AIR DEFENCE

IN a lucid article on Australia's Air Defence in your issue of April 9, the contributor lays stress on the vulnerability of an invader to attack by the R.A.A.F. But, with its supply and maintenance organisation concentrated in two points on the coast, is not the R.A.A.F. equally vulnerable to the fleet aircraft of the aggressor? Thus, is seems that the only logical policy would lead to the establishment of main bases well inland and to the employment of coastal aerodromes as advance posts, for the present system (in effect front line aerodrome and supply depot combined) recalls the old adage of too many eggs in one basket a little too strongly, methinks! There is no lack of suitable sites inland. Cootamundra, for instance (where, incidentally, your heading photograph was taken), would seem to be ideally situated.

Perhaps this is a matter of detail only, but such details make or mar a victory. TARGET.

Hamble, Hants.

IN BRIEF

Wing Cdr. A. S. G. Lee is compiling a record of the history of the Hornchurch Royal Air Force Station, and is anxious for information, particularly covering the war years. He has an outline of No. 39 Squadron's history, but little about Nos. 78 and 189. He is in possession of all details regarding No. 46.

Wing Cdr. Lee will be glad to hear from officers and men who served at this station during the war, and can supply details of the more interesting events, or can loan records. Letters should be addressed to the Commanding Officer, and marked "History."

THE ROYAL AIR FORCE

SERVICE NOTES AND NEWS AIR MINISTRY ANNOUNCEMENTS

TRAINING BOAT PILOTS: All pilots who are posted to a flying boat squadron are first sent for a course with the Seaplane Training Squadron at Calshot. The Saro Cloud is used for preliminary training. (*Flight* photograph.)

STAFF CONVERSATIONS

The Royal Air Force representatives at the Staff Conversations which began on April 15 were Air Vice-Marshal C. L. Courtney, C.B., C.B.E., D.S.O., Group Capt. A. T. Harris, O.B.E., A.F.C., and Wing Cdr. J. O. Andrews, D.S.O., M.C.

AIRCRAFT CARRIERS

H.M.S. *Eagle*, at present in reserve at Devonport, is to be brought forward for foreign service early in 1937 to take the place of H.M.S. *Hermes*, on the China station. At present the *Hermes* is refitting at Hong Kong, after several months at Singapore.

CADRE AND A.A.F. SQUADRONS

Cadre and Auxiliary Air Force squadrons will carry out annual training during 1936 as follows:—

Cadre Squadrons

No. 500 (County of Kent) (B) Squadron, May 11 to 23, at Hucknall.
No. 501 (City of Bristol) (B) Squadron, August 1 to 14, at Manston.
No. 502 (Ulster) (B) Squadron, July 13 to 25, at Manston.
No. 503 (County of Lincoln) (B) Squadron, July 13 to 25, at Hawkinge.
No. 504 (County of Nottingham) (B) Squadron, July 25 to August 8, at Hawkinge.

Auxiliary Air Force Squadrons

No. 600 (City of London) (F) Squadron, August 8 to 22, at Hawkinge.
No. 601 (County of London) (F) Squadron, August 2 to 16, at Lympne.
No. 602 (City of Glasgow) (B) Squadron, July 17 to 31, at Tangmere.
No. 603 (City of Edinburgh) (B) Squadron, July 12 to 26, at Leuchars Armament Training Camp.
No. 604 (County of Middlesex) (F) Squadron, August 2 to 16, at Tangmere.
No. 605 (County of Warwick) (B) Squadron, August 2 to 16, at Leuchars Armament Training Camp.
No. 607 (County of Durham) (B) Squadron, July 19 to August 2, at Manston.
No. 608 (N. Riding) (B) Squadron, August 8 to 22, at Manston.

FLYING ACCIDENT

The Air Ministry regrets to announce that Flt. Lt. Ernest Dawson, L.A/C. Percy Cuthbert, and A/C.1 Harold Eric Smith-Langridge lost their lives as the result of an aircraft accident which occurred at Peterborough on April 16. L.A/C. Stanley Arthur Rollason King was dangerously injured and died next day in the Memorial Hospital, Peterborough. Flt. Lt. Dawson was the pilot of the aircraft and A/C.1 Smith-Langridge the passenger. The other two airmen were struck by the aircraft.

THE OBSERVER CORPS

Air Comdre. A. D. Warrington-Morris, C.M.G., O.B.E., retired, has become Commandant of the Observer Corps, in succession to Air Comdre. E. A. Masterman, C.B., C.M.G., C.B.E., A.F.C., retired, who had commanded the corps since its inception.

R.A.F. STAFF COLLEGE DINNER CLUB

The annual dinner of the R.A.F. Staff College Dinner Club will be held at the May Fair Hotel on Friday, October 2. Particulars will be communicated to all members, by circular, later in the year.

ROYAL AIR FORCE GAZETTE

London Gazette, April 14, 1936

General Duties Branch

The following flying officers are granted permanent commissions in this rank (April 10):—L. C. Slee, E. A. Springall.

The following are granted short service commissions as acting pilot officers on probation with effect from and with seniority of March 30:—J. S. Adams, H. P. Blatchford, A. S. B. Blomfield, S. McC. Boal, C. P. Bomford, B. E. R. Bowden, A. M. Brown, C. A. Butler, P. G. Chapman, J. H. Coghlan, G. V. Cook, W. C. S. A. G. Cooper, J. A. Crockett, H. M. Crump, J. M. Griffith-Jones, H. Henry-May, D. B. Hobson, D. R. Hopper, E. C. Ingle-field, B. P. Jones, E. J. S. Jones, J. S. Kendrick, J. A. W. Law-rence, P. D'A. Lister, B. MacCallum, W. G. Oldbury, D. St. Q. Robinson, G. V. Smither, D. F. Spotswood, R. D. Tate, P. H. R. R. Terry, P. E. Torkington-Leech, P. F. R. Vaillant.

F. D. D. Jones is granted a short service commission as Acting Pilot Officer on probation with effect from April 1, and with seniority of March 30.

The following are granted short service commissions as Acting Pilot Officers on probation with effect from April 3, and with seniority of March 23:—R. L. Lorimer, J. P. S. Packer.

The following Pilot Officers are promoted to the rank of Flying Officer with effect from the dates stated:—R. R. Gregory (January 6); H. V. Alloway (March 1); D. F. Balsdon and P. E. Meagher (March 6); A. F. Bandi-lt (March 14); V. H. A. McBratney, L. P. Gibson, E. L. Colbeck-Welch (April 1); R. B. Middleton (April 2).

Group Capt. Sir C. J. Q. Brand, K.B.E., D.S.O., M.C., D.F.C., ceases to be seconded for duty with the Egyptian Government (April 10).

F/O. G. H. Denholm is transferred to the Reserve, Class A (April 10).

F/O. R. J. W. Barnett is transferred to the Reserve, Class A (April 11).

F/O. E. J. N. Heaven is transferred to the Reserve, Class C (April 11).

Lt. K. C. Ogilvie, R.N., Flying Officer, R.A.F., relinquishes his temporary commission on return to Naval duty (March 31).

The short service commissions of the following Acting Pilot Officers on probation are terminated on cessation of duty (April 7):—P. H. Hards, R. B. Townshend.

Dental Branch

L. C. Bellsham-Revell, L.D.S., is granted a non-permanent commission as Flying Officer with effect from and with seniority of February 1, and is seconded for duty at Guy's Hospital, London, S.E.1.

Chaplains' Branch

A. R. J. Symes is granted a short service commission with the relative rank of Squadron Leader (March 12).

Commissioned Engineer Officer

W/O. H. R. Clowes is granted a permanent commission as Flying Officer on probation with effect from March 30 and with seniority of March 18.

Memorandum

318743 Flight Cadet T. Brown is granted an honorary commission as Second Lieutenant with effect from the date of his discharge.

Erratum

In the *Gazette* of March 17, 1936, for Earle Palmer read Earle Gordon Palmer.

PRINCESS MARY'S ROYAL AIR FORCE NURSING SERVICE

Sister Miss E. K. Wright resigns her appointment (April 14).

ROYAL AIR FORCE RESERVE

Reserve of Air Force Officers

General Duties Branch

F/O. B. P. Jones is granted a commission in this rank in Class C (March 26).

The following are transferred from Class A to Class C with effect from the dates stated:—Flt. Lt. G. Rose (April 7); F/O. A. C. S. Irwin (June 26, 1935); F/O. C. W. Usher (February 22).

The following Flying Officers are transferred from Class AA (ii) to Class C with effect from the dates stated:—W. E. Hampton (March 19); W. R. Rumbold (March 29).

The notification in the *Gazette* of February 11 concerning F/O. N. J. Nock is cancelled.

SPECIAL RESERVE

General Duties Branch

P/O. R. M. Broadhead is confirmed in rank (February 9).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

General Duties Branch

Wing Commander.—H. J. Roach, A.F.C., to R.A.F. Station, Gos-port; for engineer duties, 2.4.36.

Flight Lieutenants.—R. W. P. Collings, to No. 9 Flying Training School, Thornaby, 2.4.36. L. R. S. Freestone, to No. 2 Armament Training Camp, North Coates Fitties, 1.2.36. M. H. Garnons-Williams, to No. 3 Flying Training School, Grantham, 6.4.36.

Flying Officers.—N. W. D. Marwood-Elton, to Armament Train-ing Camp, Aldergrove, 6.4.36. O. A. Morris and W. L. Stedman, to No. 7 Flying Training School, Peterborough, 6.4.36. A. G. Strutt, to Armament Training Camp, Leuchars, 6.4.36.

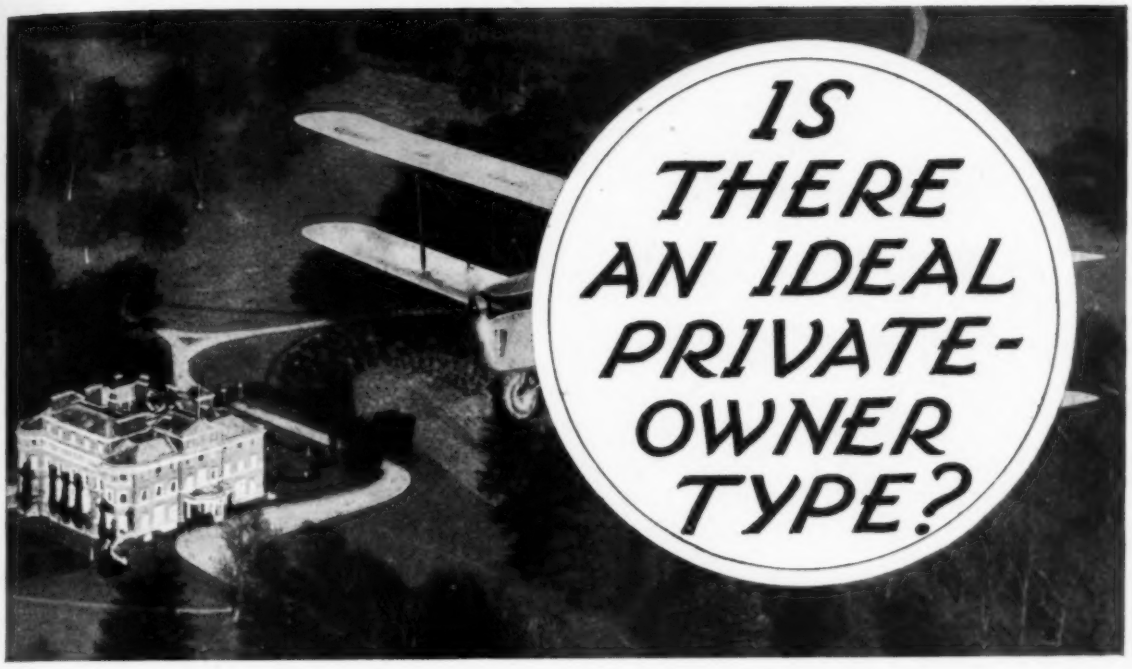
Acting Pilot Officers.—The undermentioned are posted to R.A.F. Depot, Uxbridge, on appointment to short service commissions as Acting Pilot Officers, on probation, with effect from March 23, 1936:—C. L. F. Colmore, J. C. Betts, D. F. O'Mahony Leahy, J. S. Laird, N. M. Thomas, E. R. White, N. G. Cooke, J. H. D. Chapple, N. F. Eagleton, G. R. E. Gregory, B. J. Thomas, T. R. Thomas, K. D. Currie, M. V. Longbottom, C. D. Swain, A. W. M. Street, R. W. Gautrey, D. H. Cross, J. Gillan, I. G. C. Malcolm, J. L. Nicol, R. J. Abrahams, D. E. Bell, B. P. Hart, J. A. Mackie, A. H. Rawson, C. A. Stephen, W. K. Williams, S. J. Monroe, E. F. Pope and R. H. Weston

Stores Branch

Flight Lieutenant.—E. N. A. Crowe-Browne, to R.A.F. Station, North Coates Fitties, 6.4.36.

Forthcoming Events

April 24. Bristol and Wessex Aeroplane Club: Annual Ball.
April 24. Cinque Ports Flying Club: Annual Dinner and Dance, Grand Hotel, Folkestone.
April 28. R.Ae.S. Students' Section Lecture: "Application of Aerodynamics to Mechanical Engineering," by J. L. B. Jones, 7 p.m., R.Ae.S. Library.
May 2-3. *Pou-du-Ciel* Rally, Broadway, Worcestershire.
May 10. R.Ae.S. Garden Party, Great West Aerodrome, Harmondsworth.
May 15-June 1. Stockholm Aero Show.
May 23. Empire Air Day.
May 27-June 4. Austrian Aero Club: Whitsun Tour
May 29-June 2. Swiss Aero Club: Whitsun Tour.
May 30-June 1. Isle of Man Air Races.
May 30-June 1. Aero Club de Provence: Marseilles Week-end.
May 30-June 2. Yorkshire Gliding Club: Open Meeting and Competitions.
June 6. R.A.F. Flying Club: Annual Display.
June 6-14. Czechoslovakia Aero Club: Tour
June 7. London Air Park Club: Hanworth Garden Party.
June 13-14. Opening of Brighton, Hove and Worthing Airport: International Rally.
June 20. Brooklands "At Home."
June 27. Royal Air Force Display, Hendon.
July 10 and 11. King's Cup Race.
July 18. Portsmouth Aero Club: Isle of Wight Race.
July 25-26. R.Ae.C.: Week-end Aerien.
August 1. Cinque Ports Club: Folkestone Trophy Race.
August 1-3. Yorkshire Gliding Club: Open Meeting.
August 2-15. Yorkshire Gliding Club: Instruction Camp.
August 3. Ramsgate Airport: *Pou-du-Ciel* Race.
August 15-30. Yorkshire Gliding Club: Open Meeting and Competitions.
August 29-30. Cinque Ports Club: International Rally and Wakefield Cup Race.
August 30. Gordon Bennett Balloon Race, Poland.
September 5-6. Aero Club of Hungary: Week-end Aerien.
September 12. London Aeroplane Club: Hatfield Garden Party.
September 13. Aero Club de France: Coupe Deutsch Race.
September 20 London Air Park Club: Display.
October 25. Aero Club de France: Saigon Race.
November 13-29. Fifteenth International Aero Exhibition, Paris.



IS THERE AN IDEAL PRIVATE-OWNER TYPE?

Private Aircraft Owners of To-day Give Their Views—and Provide Much Material for Discussion : Widely Differing Requirements, but a Fairly General Agreement that High Top Speeds Should be a Minor Consideration

Designers and constructors will find much food for thought in these pertinent views which representative private owners have contributed at the Editor's invitation. Editorial comment appears in a leading article in this issue.

TOP SPEED

—Should Not be Made a Fetish, Maintains Lord Willoughby de Broke in this Constructive Criticism

IN considering one's ideal machine one must obviously frame one's ideas in accordance with what it is reasonable to expect the modern designer to produce. No doubt we should like a machine which could rise and descend vertically and with a speed range of 0-200 m.p.h.! Unfortunately this desirable "kite" is a long way off.

Even so, in my humble opinion, the ideal machine for the private owner has not yet been produced, although there are one or two English and several American types which are getting very near it.

I propose to give a list of the principal characteristics I require and then crystallise them by giving a description of the machine. I feel very strongly that the modern tendency of design is getting away from the "safe and easy" type, that aeroplanes are becoming too much "aerodrome" machines, instead of being able to use small fields, and that they are becoming too much the "expert's" instead of "anyone's" aeroplane. Too much attention is being paid to top speed in the "private owner" class to the detriment and sacrifice of other qualities.

In all the characteristics I require it must be borne in mind that the machine is going to be used mainly in Great Britain, though, of course, it will be wanted for Continental touring as well.

(1) It must be safe and easy to fly, have a negligible stall, and be as near as possible impossible to spin.

(2) It must be able to get in and out of small fields and not be purely an "aerodrome" machine. Its landing speed should not be more than 40 m.p.h., and its take-off run, fully loaded and in still air, not more than one hundred yards.

(3) It must be reasonably cheap to run and so should not use more than seven or eight gallons per hour. This rules out any engine much larger than a Gipsy Major. I do not want two engines: the average private owner who houses and maintains his own machine, as I do, does not want to be bothered with servicing more than one engine. Furthermore, two engines add to the running expenses and make the machine less easy to fly.

(4) It must be a cabin machine with at least three seats and ample luggage accommodation. Four seats would be an advantage, but I do not consider this is possible with the engine-power limit I have fixed.

The two front seats should be side-by-side, with full dual control. Great attention must be paid to silencing, ventilation, heating and visibility. Provision must be made for looking out in bad weather, and for being able to land without looking through the windscreen.

(5) Electric equipment, self-starter, dynamo, batteries, landing and navigation lights should all be optional standard fittings. The same applies to blind-flying equipment.

To sum up, I would specify as my ideal a high- or low-wing monoplane, 120-150 h.p., three seats and luggage accommodation, side-by-side seating with full dual control; full electric and blind-flying equipment; speed range from 40 m.p.h. to as near 150 m.p.h. as possible, but I would *not* sacrifice other qualities for an extra 10 or 20 m.p.h.

I may have asked for the impossible, but I can only say I found very nearly all these requirements in America last winter in the shape of the Fairchild three-seater cabin monoplane with a 145 h.p. Warner Scarab engine.

Modesty prevents my naming the English type, which is the nearest approach to my ideal, but it is built not far from London, and I had a considerable hand in influencing its design. It was, however, laid down some two years ago, since when my ideas, notably as regards side-by-side seating, have changed somewhat.

Wilmot-Breguet

"FOOLPROOFNESS"

—and Low Cost the First Essentials : Lord Sempill's View

WHEN is the private owner to make his appearance? Some will say that he has already done so, but this is really a half-truth, as there are only a few enthusiasts—perhaps about the same number as there were in the opening years of motor car development at the beginning of this century. Why is this phase of air development so long in growing to substantial proportions?

The chief factors holding back such development may, it is suggested, be summarised as follows:—

(a) Too high a degree of specialised skill is required in the operation of "fixed wing" aircraft.

(b) Too heavy a financial outlay is entailed.

(c) The existing ground facilities are utterly inadequate.

To illustrate the force of the above suggestions it may be pointed out that few, if any, of that small band of private owners are able to use, or wish to use, their aircraft all the year round, as the difficulties caused at least by two of the above-mentioned disadvantages vary very greatly with the seasons—summer or winter.

It is suggested that if the Autogiro in its recently developed form can be produced in mass along the lines visualised by Lord Weir and at a price cheaper than existing types of aircraft, a far greater degree of foolproofness in operation would be provided, without which no real advance along the lines of "flying for all" can take place. The realisation of such a programme, possible from a production aspect, is not yet in sight.

So far as the present is concerned, it is suggested that the first and second of the above-mentioned points can only be met by the ultra-light aeroplane, of which type the *Pou-du-Ciel* and the Drone are the two best known in this country. They are not expensive in first cost or in running costs; in fact, on certain recent flights, of which details are given in the next paragraph, the petrol consumption was in the close neighbourhood of forty-five miles to the gallon, and over some 1,250 miles the oil consumption was negligible. About two weeks ago some useful experience was obtained with the Drone, showing its utility for making non-stop flights of some 600 miles between England and Germany, the return flight being made without more than thirty minutes being devoted to work on the engine. The only adjustment made was to one exhaust-valve tappet. The weather throughout was poor; in fact, during the last 250 miles of the return flight, conditions were such as to be quite unsuitable for normal types of light aircraft. Fog and heavy rain were encountered, and at other times the wind was so strong that the little machine was losing ground at about 5 m.p.h., although flying only a few feet from the surface. The advantage of a wide speed range (20-65 m.p.h.) and the ease with which landings can be made in confined spaces gave a high degree of confidence.

The ultra-light aeroplane is, of course, by itself no novelty, but so far it has been regarded as a type of machine suitable for local flying only, but extended flights can be made, the running costs being comparable with those of a small car.

Sempill

FOR FOREIGN TOURING

A Comprehensive "Air Yacht" Specification by Mr. W. Lindsay Everard, M.P.

IN the following notes I have presumed that the private owner is going to use his machine principally on foreign tours, and I will commence by giving an outline of the type of machine that would meet my requirements best.

I am not prejudiced in favour of a biplane or a monoplane. The biplane gives a feeling of strength and is best for manœuvring, and the low-wing monoplane is usually faster and more suitable for the fitting of a retractable undercarriage and flaps. The high-wing monoplane gives the best passenger view and is easy for entry and exit, while the airscrews are well clear of the ground, but refuelling and engine maintenance are more difficult.

The performance of the selected machine should be:—

Cruising speed, at least 150 m.p.h.
Range, at least 800 miles.
Take-off run, not exceeding 200 yd.
Landing run, not exceeding 120 yd.

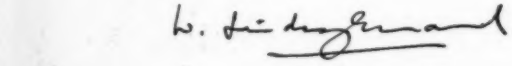
The machine should carry, with full tanks, two pilots, four passengers, luggage, wireless and necessary spares. I prefer two engines, on either of which the machine will maintain a height at full load of at least 3,000ft.

In the cabin I would require seating accommodation

for the four passengers, in pairs, with the front adjustable seats level with the leading edge to give maximum view. There should be ample leg room, and it should be possible to change places in the air with ease. Each seat should have pockets alongside for books, maps, etc., also arm-slings and arm- and head-rests to give extra comfort. Provision for stowing parachutes and lifebelts should be made alongside each seat, and leather upholstery is preferred.

In the cabin the front windows should give a good forward view, and a window at the rear which will open is very important, both for ventilation in hot weather and for taking photographs. Cabin ventilators and heating devices should be provided, and an electric fan for keeping the cabin cool in hot countries when the machine is standing on the aerodrome. Special insulating material to prevent noise and a thick carpet to absorb the vibration are definitely necessary. The cabin should be as sound- and draught-proof and as free from vibration as possible, and in no circumstances should it leak. A light-luggage rack in the cabin is useful, with a separate compartment for heavier luggage. A pocket for log books and carnet should be arranged on the entrance door, which should have slip hinges. The pilots should sit side by side, with sliding seats to enable ease of entrance or exit; they should have plenty of room for maps and a blind to keep off the sun. As I look upon a private touring aircraft in the same category as a yacht, I require a method of flying the Civil Air Ensign after landing on foreign aerodromes.

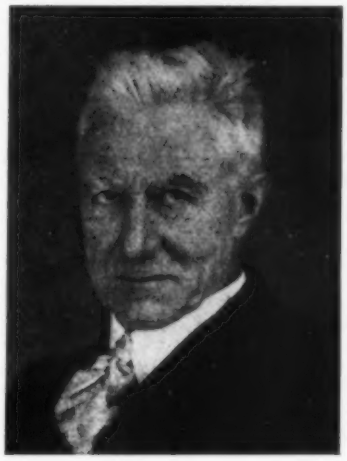
As far as the machine itself is concerned, I would have it fitted with slots, split trailing-edge flaps and wheel brakes, so that landings could be made in a short space over obstructions. The undercarriage should be of simple design, with balloon tyres and tail wheel, and give a good ground clearance. If it retracts it should be worked in both directions hydraulically, and full provision should be made with Klaxons and lights to avoid errors. Electric wing landing lights and wing-tip navigation lights are, of course, essential. Full dual control should be fitted, including throttles, and the engine flooding and starting should be worked from the cabin. Unless V.P. screws are fitted, it is recommended that the Schwarz type should be used for durability. Auto-Klean petrol and oil filters should be fitted, and the instruments should be of the most up-to-date type for blind flying, a sensitive altimeter being of great importance. Wireless, with an extension to one of the passengers' seats, working on fixed and trailing aerials, with homing attachment, should be fitted. The provision of hand grips for use on the ground at wing tips and rear of fuselage is very useful.



"NO IDEAL CRAFT"

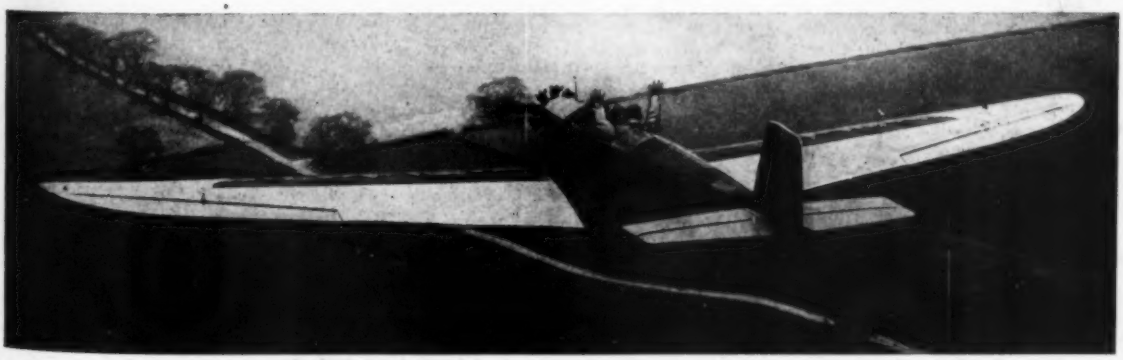
Sound Sense in Whimsical Words from Mr. A. J. Richardson, a 74-years-young Owner of a Sporting Two-seater Monoplane

OVER eight years ago a Swiss incarnation of the department of Providence that has the care of children, drunkards and old men told me on the rink at Maloja of the German Klemm. I went, saw and ordered. The machine has been in the air this month [March—a most inclement March—at the time Mr. Richardson penned these notes—ED.] and, reared with horses, quite ignorant of petrol engines, I am one of the least competent pilots in Europe.



The cantilever low wing was a Junkers world patent, a development from the glider. English manufacturers, making biplanes developed from the box kite, were averse to the payment of royalties. Now that the patent has expired they are building low-wing monoplanes whose advantage lies in a perfect view in all directions and in the safety afforded by the amount of stuff below the pilot that takes the concussion in a crash. And not even an aeroplane can jump the tariff wall erected round Britain in recent years. The £, too, is now worth only 12s., instead of 20s., for foreign dealings, which accounts for the vogue of "pleasure" imprisonment in ships with the gentle excitement of a remote chance of being drowned.

There can be no ideal craft for the private owner. Skill as a pilot, knowledge of machinery, instruments, navigation and W/T, income, purpose, sociability, all vary with individuals. The competent pilot takes little risk when he puts a big sum into his hobby. The millionaire seldom, for choice, drives a donkey or an old baby Austin. The sociable person, male or female, enjoys the propinquity of, at least, one other human mind; but the contemplative character, to whom collective security makes no appeal,



Mr. A. J. Richardson, the 74-year-old enthusiast who expresses his views above, put his hands up in surrender when a strange biplane "attacked" his Salmson Klemm as he flew it towards his ground at North Walsham, Norfolk; and the biplane's passenger was armed with a camera.

is stimulated by solitude high above beautiful clouds, land and water, and knowing that the brain functions most brilliantly when the body is in a recumbent position he or she prefers the sofa to the bucket seat during ethical discussions. So, one person wants a cabin seating two or more, the other is content with accommodation for self only, and there mixes with the music of the spheres the voice of a mechanical Mephistopheles humming jovially Goethe's Song of the Flea.

It is, perhaps, wise to invest in what is produced in one's neighbourhood. Alterations, repairs, overhauls, are simplified. The machine should, certainly, be of the country in which the owner is domiciled. Inspectors, apparently of the same mental and social stratum as the old women who love to assume a familiarity in addressing a man by some military title instead of by the courteous "Mr." and his name, have the national conceit that puts all foreigners in a category of semi-idiots and that condemns, at sight, anything foreign it does not instantly comprehend. Parasitology is as valuable to the private owner as it is to the doctor or to the veterinary surgeon.

A. J. Richardson

AN OPEN MACHINE

—but a Refined Design : Mr. Eric W. Walford's Requirements

HITHERTO the private owner of an aeroplane has not received much encouragement, and it has even been maintained by people who ought to know better that subsidies should not be awarded to women, or to men above "military age." As an "antique" (I received my aerial baptism as far back as 1910) I naturally hold very different views. Every pilot and, more particularly, every owner of an aeroplane is an active propaganda agent in inducing younger people to take up flying, and should therefore receive every possible form of assistance towards this end.

It is, perhaps, natural that such a person as myself should have different notions as to what constitutes the ideal machine for a private owner from those which would be held by a younger and more able pilot. Long distances at high speed do not appeal to one as one grows older, but that does not mean that one loses anything of the charm of flying. Probably my greatest enjoyment is obtained, not in stunting or in trying to beat records, but from a leisurely progress over beautiful country, or through delightful cloud scenery, from aerial photography, and from giving my friends and those who have never previously been in the air an opportunity of enjoying these things and flying generally.

Good all-round visibility would be one of the outstanding features of my ideal machine and, consequently, I much prefer an open machine, but the cockpits must be much more draught-proof than on my present Gipsy Moth, which, of course, is, in a sense, out of date. Side-by-side seating does not give one the ground visibility on both sides which I like, and conversation in an open machine of this type still necessitates the use of earphones. This brings one to the important matter of audibility, and that to noise. Ordinary earphones, unless very carefully attended to, do not encourage one to chat very much to one's passenger. Silencing, such as it is, is not carried far enough in most machines.

As regards maintenance, the conventional biplane takes more looking after than a cantilever monoplane, and the latter is a more efficient machine, but for my particular purpose I find that the low wings interfere too much with ground visibility and photography. On an open high-wing monoplane it would seem that lift wires or struts are possibly essential, and for this and other reasons this type is not so efficient, but to a "potterer" like myself that is not of very great moment.

Summing up, my ideal—and I cannot but think that it would form a suitable machine for many purposes—would comprise a tandem-seated high-box-wing monoplane with a four-cylinder engine which is simple to maintain and is efficiently silenced. The cockpits would be proof against draughts from below and the screens of ample size. It would have something very much better than the ordinary mouthpiece-earphone communication between the occupants. I should not want a maximum speed in excess of 100 miles an hour nor a landing speed below about 35 miles an hour. It must have folding wings and, of course, a real landing chassis and air wheels.

The ideal machine, for my particular and peculiar purposes, would probably resemble somewhat the Drone, on a larger scale, with tandem seating, if that were possible.

Eric Walford.

CABIN COMFORT

—with Low First Cost and Generous Seating Accommodation Appeal to Mr. G. S. Davison

AS one who took up flying only in middle age, with no previous war experience, I am scarcely qualified to make statements as to what is the ideal type of machine for the private owner. Perhaps, however, my very inexperience may make it easier for me to visualise the ideal, for I am not hampered by knowledge of manufacturing costs and technical difficulties.

I have owned three different types of aircraft—a two-seater open biplane, a high-wing cabin monoplane, and a low-wing cabin monoplane. I prefer the low-wing construction, largely because it seems to make manœuvring on the ground in strong winds easier and safer.

I think a cabin machine is essential. There is as much difference between flying in an open machine and a cabin machine as there is between motor cycling and motoring. Whilst in my own opinion motor cycling is a finer sport than motoring, a car is far superior to a motor cycle as regards comfort and general utility. So it is with the cabin aeroplane.

Furthermore, it must be remembered that private owners

are usually getting on towards middle age. The gilded youth who owns an aeroplane bought by his father is rare. Among more than a dozen private owners at my own club there is only one, I think, who is under thirty years of age. The older the pilot the less he likes open machines and aerobatics, and the more he likes cabin comfort and cleanliness.

Up to date, therefore, my ideal is a low-wing cabin monoplane. Now what about the engine—or engines? For safety's sake I would say two engines, but the ideal machine must be cheap—certainly it must be well under £1,000—and, so far as one can see at present, this means one engine.

Well, then, radial or in-line? Each has much to commend it. The slow-running four-cylinder in-line type imparts a feeling of confidence, but on the whole I think I prefer the smoother-running radial pattern which, furthermore, should have the advantage as regards power-to-weight ratio.

Now, as to seating accommodation. Side-by-side seating with an occasional seat for a third passenger should be ideal. If four can be carried, with the accommodation of a baby saloon car, without the price reaching £1,000, so much the better.

A really good take-off, maximum of 110 m.p.h., cruising speed of 100 m.p.h., and landing speed of not more than 30 (whether obtained by flaps or not) seem to complete the specification.

G. S. Davis

SPORTING FLYING

—with "a Moderately Clean Face": Mrs. Elise Battye is Well Content with Her Present Machine

YOU have asked me to give my views on what I consider is the ideal machine and equipment for the private owner. This depends a great deal on how much the pilot wishes to fly and for what he or she intends to use the machine. I have no experience of any aeroplanes other than the two I have actually owned. The first was a Gipsy I Moth and the second my present Hawk Major.

I used that Moth ceaselessly for three and a half years. I learnt to fly in 1930 and got it about a year later, after I had done about one hundred hours solo; and I used it exactly as one would a car. I took it abroad and raced it in this country, getting some amazing speeds out of it, but nowhere myself, owing to my own very peculiar method of navigation in those days. But that was not the fault of the Gipsy I, which used to give about 106 m.p.h.—usually dead across whatever course I was making for. I had an extra tank fitted to give me a range of four and a half hours, a clock which never failed me, and Sutton harness to reduce the bumps in rough weather—not because I aspired to aerobatics, as these have always terrified me.

I flew that Moth about 500 hours and I had only one real forced landing during the whole time, due to some minor engine trouble. I am only recalling it now because it was on that occasion I first met Flt. Lt. Tommy Rose, who came from Sywell to collect the pieces. The Moth had a broken longeron and its owner a black eye, and—so like Tommy—he never once mentioned the fact that the field was at least a mile square; he made me feel that I had been really clever in getting down at all.

Next I sold half a pearl necklace and a fur coat and bought the Hawk Major, and I do consider that this machine is ideal in every way for the private owner. It is warm inside the cockpit, so one need not arrive at a place looking like an arctic explorer. It is fast and easy to fly. I fitted a turn-and-bank and a pitch-indicator, instruments which I consider are really essential, as they prove the greatest help even if the weather is only slightly hazy, particularly across the sea. I put harness into both seats and have a back tank which can be fitted into the locker when necessary.

One feels that in this machine one can fly to anywhere at home or abroad in the greatest comfort as one wishes, and it has that extra turn of speed that seems to make all the difference for getting places. Speaking as the worst navigator in Europe, I found that the Hawk was a great help, as somehow the places turned up where I expected them to, and the compass remained permanently steady in rough weather.

I have never owned a closed machine, so I have no experience of how I should feel flying one, but I know I have been perfectly happy in both my open ones and I have had more fun than I should have believed possible. I do feel most strongly that no private owner could have a better aeroplane *to-day* than the Hawk Major, in which he or she can combine cross-country flying, touring abroad and a bit of racing thrown in, and safety and comfort; and you can step out at a garden party with a moderately clean face.

I expect most professional pilots will be very scornful about the foregoing, but I hope my remarks will help the *mugs*, and, after all, that's what you asked my views for, wasn't it? [Well, hardly.—ED.]

Elise Battye

Concerning a New Car

THE car which is seen in the heading picture on page 445 of this issue is the new 12/48 h.p. Wolseley, a fully illustrated description of which appears in to-morrow's issue of *The Autocar*.

Piston-ring Data

ENGINE repair shop managers and others will find much useful information in a wall chart of detailed piston-ring types, dimensions, wall pressures and loads, with metric equivalents. It is obtainable from Wellworthy, Ltd., Lymington, Hants.

Mr. P. E. Gordon-Marshall

IT is announced that Mr. P. E. Gordon-Marshall has joined the Sperry Gyroscope Company, to take up duties in connection with the sale of their blind-flying instruments. He has been manager of Brian Lewis and Co., Ltd., since Flt. Lt. Christopher Clarkson vacated that position some months ago.

The Finishing Touch

A POINT of interest worthy of mention in connection with C. W. A. Scott's Flying Display—the opening of which was reported in *Flight* last week—is that the striking finish of the motor fleet and some of the aircraft is carried out with "Syntholux" and "Cellusol" dope and lacquer, products of Docker Bros., of Ladywood, Birmingham, 16.

LIGHT AIRCRAFT EQUIPMENT

A Review of some of the More Popular Items of Optional Equipment for Machine and Pilot now on the Market : Instrument "Whys and Wherefores" Explained for the Benefit of the Newcomer

Although not absolutely typical, the instrument layout of Lord Sempill's Puss Moth is interesting. It includes an R.T.E homing receiver, while in the centre panel are the Sperry artificial horizon and directional gyro and the homing indicator.

DURING the earliest days of flying, the unfortunate—or fortunate, according to one's point of view—aeroplane pilot had a joy stick and a foot bar to operate, and usually a "blip switch" for controlling his engine, and very little else. He was supposed to judge what his aeroplane was doing by "feel," and his only means of knowing, or rather guessing, how his engine was going was by listening to its note. The early aviators became surprisingly skilled at telling by such crude means whether or not all was well. They had to; their lives depended upon it. Nowadays it is a different matter. All sorts of instruments have been placed at the disposal of the pilot for keeping him informed exactly of what is happening to his aeroplane and engine, and although the choice of instruments lies partly with the owner, a certain number of instruments are regarded as essential to the safe handling of an aircraft.

Air-speed Indicators

Most important, from a safety point of view, is perhaps the air-speed indicator. From the very beginning of his school period the budding pilot is taught to watch his A.S.I. so that he may never let the speed drop below a certain minimum, depending upon the particular type of aeroplane he is flying. Fundamentally, as most readers know, the air-speed indicator depends upon the effect of dynamic pressure, which is "collected," so to speak, in the pitot tube, while another tube, known as the static, has its end shielded so that it is merely open to still air. The tubes lead to a flexible diaphragm, which is in turn linked to the pointer on the dial, and the difference in pressure on the two sides of the diaphragm is read off as speed in m.p.h. Other types are used, but to a smaller extent—such as the very simple strut type produced by the De Havilland firm as an auxiliary check. Next in importance, although not strictly speaking a flying instrument, comes the engine revolution counter.

The A.S.I. and the rev. counter constitute the absolute minimum of instruments with which anyone could think of taking a machine into the air; and they would suffice merely for flying around an aerodrome. As soon as the pilot aspires to something more ambitious than that, he will begin to feel the need of quite a number of other instruments. For one thing, he will certainly require an altimeter to tell him at any time at what height he is in relation to his point of departure. There are several makes of these three instruments on the market, but those most commonly found are, like many other aircraft instruments, products of Smith's Aircraft Instruments, of Cricklewood, London, N.W.2, and of Short and Mason, Ltd., Aneroid Works, London, E.17. The altimeter is virtually a barometer, which depends for its action upon the surrounding air pressure, which compresses a small metal capsule. The difference in pressure is translated into altitude in feet.

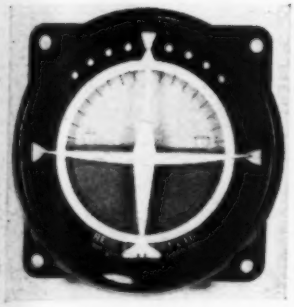
"Bradshaw" Flying

"Flying by Bradshaw" is an expression which denotes finding one's way across country by following a known and identified railway line. For serious cross-country flying some knowledge of air navigation is essential, and the first requirement is a reliable compass. Of these there are quite a number on the market. Owing to the ability of an aeroplane to make very rapid manœuvres, it is desirable to use a type of compass which is "dead beat," so that the needle does not get into a series of violent swings which would make it difficult to use the compass with any degree of accuracy. A very popular type is the Husun Mark IIIA, marketed by Smith's. Other makes which have been used extensively are the "Sestrel," obtainable from Short and Mason, and the large and small compasses made by Kelvin, Bottomley and Baird, Ltd., of 18, Cambridge Street, Glasgow. Usually the aeroplane manufacturer standardises one or other of these types, but changes can usually be made if the purchaser so desires.

Generally speaking, the magnetic compass is very reliable and can be trusted provided its small peculiarities are understood. On northerly courses these are most in evidence, and during recent years instruments have been introduced which supplement the compass by providing a more accurate and delicate indication of small departures from the course originally set by compass. These instruments have as their basis a small gyroscope which tends to remain in the position in which it was originally set in motion. This fact is made use of by linking the gyroscope to the indicator needle or pointer. If the machine swings slightly off its course, the gyroscope tries to remain in its original position, though the framework which carries it moves with the aeroplane. According to whether the instrument is of the "free" or "restrained" type this movement is indicated on the instrument dial as the actual displacement or by a swing of the pointer, showing the rate of left or right turn, as the case may be.

Turn-and-Bank Indicators

Sensitive course-keeping was the original object of the gyroscopic turn indicator, but during recent years its functions have been applied more specifically to what is known as "blind flying"; that is to say, flying entirely by instruments, in weather conditions when the ground and horizon cannot be seen. In such conditions the pilot's turn indicator will tell him if he is wandering off his course, but it will not tell him if he is sideslipping gently all the time. Another instrument becomes necessary if this information is to be available. Known as a bank indicator, it shows not



The Reid and Sigrist Gyorizon, a compact instrument which combines the characteristics of both the turn indicator and the artificial horizon.

only whether the aeroplane is on a level keel laterally, but also whether it is correctly banked during a turn of any radius. Sometimes the bank indicator is operated by another gyroscope, while in other makes this bank indicator is either a pendulum geared to a pointer, or consists of a liquid in a transparent container, the level of the liquid providing a horizon, so to speak, by which the pilot can judge the attitude of his machine.

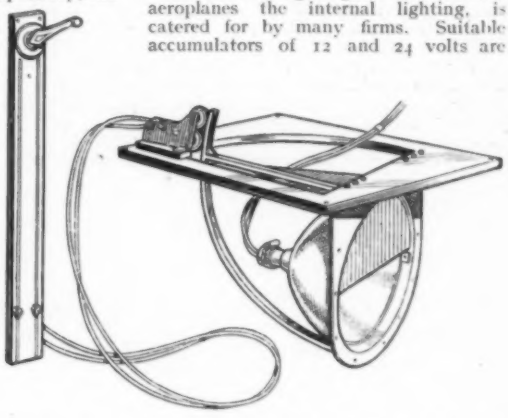
A considerable number of different makes of turn and bank indicators are on the market. They differ considerably in detail, but all depend upon the fundamental principles outlined above. Frequently the turn and bank indicators are combined in one instrument. Reid and Sigrist, Ltd., of New Malden, Surrey, introduced the turn and bank indicator used on R.A.F. machines and on many civil aircraft. More recently that firm has put on the market a smaller, cheaper and simpler type, known as the Gyorizon. Smith's Aircraft Instruments, of Cricklewood, include in their remarkably complete range of instruments turn and bank indicators. Turn indicators are also available from Short and Mason (the Brown instrument), Cooke, Troughton and Simms, of York (the Schilovsky) and the Williamson Manufacturing Co., Ltd., of Willesden, London, N.W.10 (the Pullin), while the Sperry Company specialise in "free" gyroscopic instruments, known as the artificial horizon and directional gyro.

All the instruments mentioned above serve to *indicate* what the aircraft is doing; they do not, of course correct deviations from the desired attitude of the aeroplane. Mechanisms are, however, available which will actually *control* the aeroplane. Broadly speaking, the same types of gyroscopic instruments are used, but instead of being merely linked to indicating pointers they are connected to relays which bring into operation locally supplied power (either of hydraulic or of pneumatic piston operation) which in turn work the aeroplane controls in the desired manner. These instruments, usually known as automatic pilots, are fairly expensive, and consequently have not come into general use in privately owned aeroplanes. On commercial aircraft, however, they serve to relieve the pilot of the actual controlling of his machine on a long flight, and leave him free to attend to navigation and other matters. Automatic pilots are available from the Sperry Gyroscope Co., Ltd., Great West Road, Brentford, Middlesex, Smith's Aircraft Instruments, and from P.B. Deviators, Ltd., of Croydon.

Anyone who has flown with a drift sight will admit the serious value of this instrument, which enables a pilot to obtain and to make allowance for his drift just as soon as he is on his course and at his operating height. Normally, a drift sight takes the form of a graduated rotating ring, with grid-wires, which can be turned round in flight until earthly objects move, so to speak, along a line which is parallel to the wires. The amount of drift is then read off, the compass reset and the process repeated until full allowance has been made. Both Smith's Aircraft Instruments and Short and Masón produce such instruments.

Electrical Equipment

NOT every aeroplane type used by the private owner is fitted with radio, but there are many other uses for electricity on board, apart from that associated with the engine ignition. For example, the private owner who uses his machine for serious touring will not be content to interrupt his flights always at dusk. This means that the navigation lights prescribed by the Air Navigation Directions have to be fitted. These follow marine practice in that they show red to port and green to starboard, with a white light visible from aft of the aeroplane. Sometimes these lights are mounted separately, one on each wing tip and one on the rudder, but combined types are available which, mounted in a suitable central position on the aircraft, throw the coloured beams in the desired directions from a single source of light. A light of this latter type is the "Demec," manufactured by Mechanisms, of George Street, Croydon.



One of three types of Harley landing light which are handled by Smith's Aircraft Instruments. This is the retractable pattern, intended for fitting in the underside of a wing or fuselage. Not only does the control enable the lamp to be pulled up flush with the surface, but it also allows the beam to be adjusted to any desired angle.

It is not always at an airport equipped with night landing facilities that a private owner wishes to alight after dark, and therefore it becomes essential to carry on the aeroplane itself some means whereby the ground below can be illuminated during the approach and landing. Holt magnesium flares mounted under the wing tips have proved their value for very many years and provide a very pleasant diffused light. These flares are obtainable from the Y.S.C., Ltd., of 13, Thavies Inn, London, E.C.1. The same firm also supplies the red, white and green signal lights fired from Very pistols.

Electric landing lights, mounted either on the leading edge (in single-engined aeroplanes) or in the nose of the fuselage of twin-engined types, are available in several forms and from different makers. The Lucas landing light is designed to be housed in the leading edge of a wing, covered by a transparent material, and can be "aimed" in several directions so as to illuminate any particular area. Landing lights of internal and external types are made by Vickers-Armstrongs, Ltd., both having the inclination of the lamp controlled by cables. The external type is carried in a streamline casing.

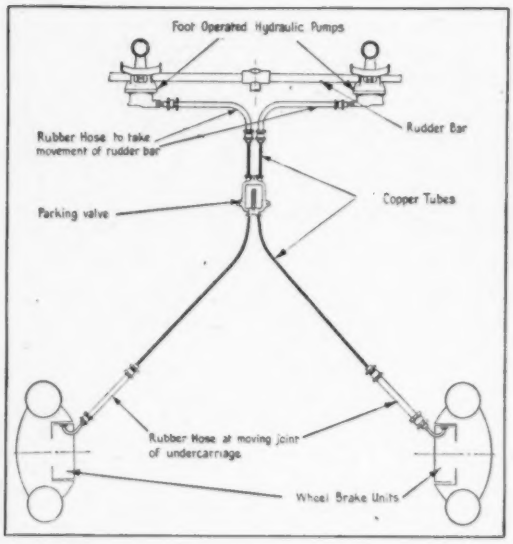
Smith's Aircraft Instruments, Ltd., handle three varieties of the well-known Harley landing light, a vertical dipper pattern, a fully retractable type, and a streamline type for external mounting. The three types are further available in 6in. and 8in. diameters, 12 volts, and there is an 11in. model taking 10 amps. at 24 volts.

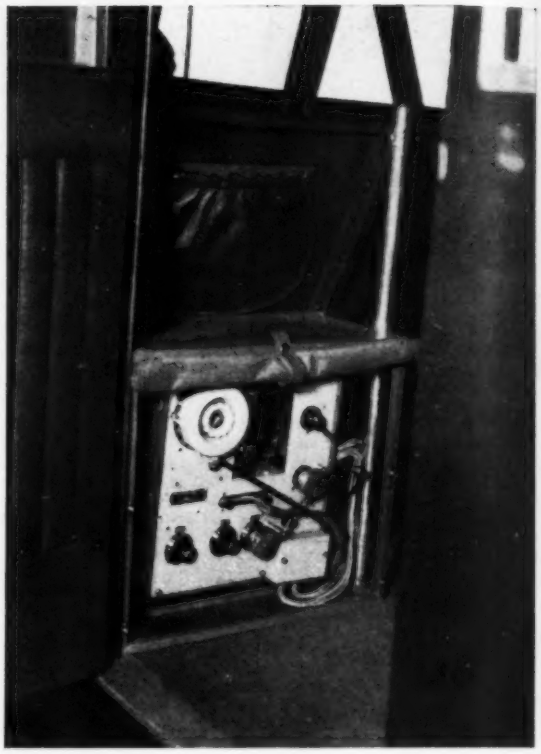
The American Grimes landing light is handled in the country by F. J. A. Cameron, of 2, John Street, London, W.1. This light is intended to be mounted in the underside of a wing, and normally lies flush with the wing surface, in which position the light shines downward. By electric operation the frame of the light can be swung about a horizontal hinge so that its direction can be varied from vertical to horizontal.

Instrument lighting, and in cabin aeroplanes the internal lighting, is catered for by many firms. Suitable accumulators of 12 and 24 volts are available from such makers as Peto and Radford, of 50, Grosvenor Gardens, London, S.W.1 (the Dagenite), and the Chloride Electrical Storage Co., Ltd., of Manchester (the Exide). Electric generators, starters, etc., are available from Rotax, Ltd., of Willesden Junction, London, N.W.10, B.T.H., Ltd., of Rugby, and D. H. Bonnella and Son, Ltd., of 46-48, Osnaburgh Street, London, N.W.1, manufacture a large range of lighting accessories and switchgear.

Wheel Brakes

ON most modern aircraft wheel brakes are standardised. The systems in use differ in details, some being hydraulically operated, others pneumatically, and yet others mechanically. It is customary to arrange for a brake installation which enables the brake on one wheel or the other to be applied independently so that the brakes can be


Foot Operated Hydraulic Pumps
Rudder Bar
Rubber Hose to take movement of rudder bar
Copper Tubes
Parking valve
Rubber Hose at moving joint of undercarriage
Wheel Brake Units



A diagrammatic representation of a Dunlop braking system for light aircraft. Capable of being stowed unobtrusively, the Marconi A.D.49 for private owners.

used for manœuvring on the ground at speeds so low that the air rudder would have little or no effect. For a straight pull-up both brakes are, of course, applied evenly, while for turning they are applied differentially.

A "parking" control, for use when the brakes are to be kept in the "on" position, is also incorporatd as a rule.

The name of Bendix, Ltd., Tyseley, Birmingham, needs no introduction where brakes are concerned; their aircraft brakes have mechanical operation and Servo action. The Dunlop Rubber Co., St. James's Street, London, who make a wide variety of aircraft wheels and tyres, offer pneumatic and hydraulic types of brake gear, including one of the latter type (illustrated above) for light aircraft. Lockheed (Automotive Products Co., Ltd., Leamington Spa, Warwickshire) hydraulic actuating gear, largely used in aircraft work for undercarriage and flap operation, also finds a place for brake actuation. Palmer (The Palmer Tyre, Ltd., Thames House, Millbank, London, S.W.1) aircraft wheels and tyres are extremely well known, and simplicity in design is a feature of their pneumatic and hydraulic braking systems. Lastly, pneumatic and hydraulic systems are made by Vickers Aviation, Ltd., of Weybridge, Surrey.

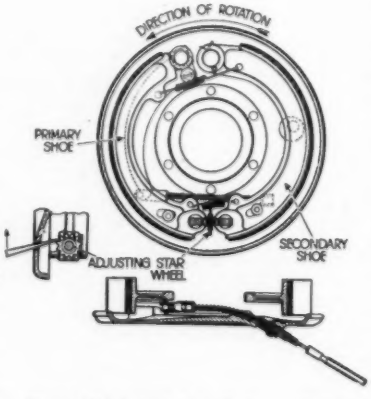
Radio

WITH the likelihood that a great many airports in this country will eventually be controlled in bad weather, private owners are interesting themselves more and more nowadays in radio. Those, in fact, who wish to fly regularly, winter and summer, must carry and learn to operate two-way radio equipment, though a simple receiving set—and particularly one with a homing attachment—can be of very considerable value now that there is a regular weather broadcast.

In this country the ability to use radio telephony will suffice—and this ability does not require a great deal of preliminary hard work—but when travelling abroad it is essential to work on Morse and to understand the more important code abbreviations. There is, after all, very little time to look these up in a book. Furthermore, the control officers here and abroad have little or no patience with the operator who does not know what he is doing. Nevertheless, it would not be true to say that either R/T or W/T operation are beyond the capacity of the intelligent amateur.

All of the better-known manufacturers of radio equipment produce sets which are suited to the needs of the private owner, but it will suffice here to mention the three outstanding items. The Plessey Company, whose sales are handled by Radio Transmission Equipment, Ltd., of 111, Charing Cross Road, London, W.C.2, have for some time been producing a combined receiving and homing set, and this is standardised on one well-known make of machine and has been fitted to a number of others. It can be used, as its name implies, for homing on broadcasting and other stations as well as for the reception of weather reports and the like. Standard Telephones and Cables, Ltd., of Aldwych, London, W.C.2, make a radio compass which can be used for taking bearings, for homing, or for normal reception, in addition to a range of normal transmitting and receiving sets.

A new two-way set, designed especially for the private owner, has recently been developed by the Marconi's Wireless Telegraph Company, of Electra House, London, W.C.2. The total equipment weighs about 62lb. and has a transmitting range of 200 to 300 miles when being used for telegraphy. It seems possible that the private owner may eventually have his own short-wave stations and Transreceivers, Ltd., of 444, Ewell Road, Surbiton, Surrey, make an interesting little two-way set which works on a wavelength of 10 metres and weighs only 15lb.



Easy adjustment is a feature of the Bendix brake which should appeal to the private operator.

Personal Equipment

NO matter how well equipped his machine may be, no pilot—of an open aircraft, at any rate—can really enjoy his flying unless his clothing is suited to the job in hand. While there are days in high summer when one can fly warmly in flannel bags and a cricket shirt, the winter (which only too often seems to include autumn and spring as well) calls for kit which can defy almost Arctic cold. While a pullover or two, a jacket, a woollen muffler, and an overcoat may suffice for aerodrome circuits, cold-weather cross-country or altitude work in an open machine demands kit

of the leather coat or sidcot suit variety, together with flying suits and warm (but not "ham-fisted" gloves).

As regards headgear, too, a properly fitting helmet which allows the earphones (if used) to lie exactly where they should do in relation to the ears, makes all the difference between complete peace of mind and considerable minor irritation.

To review in detail the many items of clothing now available would occupy an unconscionable amount of space, so we must content ourselves with naming the leading firms which the new pilot would do well to consult when equipping himself. D. Lewis, Ltd., of 124, Great Portland Street, London, W.1, make and sell almost every variety of flying suit, helmet, goggles, leather coat, etc. Another well-known firm, S. Lewis, of 27, Carburton Street, London, W.1, who supply the leading clubs, also offer a most extensive range of clothing of all types. A good selection of inexpensive kit is offered by Marble Arch Motor Supplies, 133 and 135, Edgware Road, London, W.2. Flying clothing, again, figures among the many types of garments handled by Moss Bros. and Co., Ltd., of Covent Garden, London, W.C.2. Service kit is a speciality of Burch's, Bedford Street, London, W.C.2; Burberrys, Ltd., Haymarket, London, S.W.1 (who are contractors by appointment to the Royal Air Force College, Cranwell); Fulcher and Co., 21, Savile Row, London, W.1; Gieves, Ltd., 21, Old Bond Street, London, W.1; and Alkit, Ltd., Cambridge Circus, London, W.C.2.

The comfortable and exceedingly practical Meyrowitz goggles (E. B. Meyrowitz, Ltd., 1a, Old Bond Street, London, W.1) and the very well-known Triplex goggles (Triplex Safety Glass Co., 1, Albemarle Street, W.1) are stocked by most opticians and clothing outfitters.

For cabin machines Irvins make a parachute with lap-strap harness. The pack forms a cushion.

Under the heading of personal equipment, too, comes parachutes, though they are not, as yet, used to any great extent by non-Service flying people, mainly on the score of their rather high cost. Yet, as "Indicator" remarked in his weekly notes a short time ago, it is undeniable that possession of one gives many people an added feeling of confidence, especially when indulging in aerobatics, cloud-flying, and other departures from the conventional.

Four makes, embracing a larger number of different types, are available. Parachute packs neatly incorporated in orthodox flying suits are a speciality of the G.Q. Parachute Co., Ltd., of Stoke Road, Guildford, Surrey. Irving Airchute of Great Britain, Ltd., Letchworth, Herts, make several patterns as standardised in the Royal Air Force, and also the "Chairchute" (the name explains much), which should appeal to private owners of cabin aircraft. The British Russell Parachute Co., Dunsmure Road, Stoke Newington, London, N.16, make the Russell "Lobe," with its distinctively shaped canopy. The fourth make is the Pak, manufactured in several types by the Pak Parachute Co., Ltd., 175a, Streatham Road, Mitcham, Surrey.

Finally, under the heading of "personal equipment" may be included such items as loose seat cushions, made in their famous "Float-on-Air" type by David Moseley and Sons, Ltd., of Ardwick, Manchester, and in "Dunlopillo" by the Dunlop Rubber Co., Ltd.

Fire Extinguishers

ALTHOUGH fire-fighting equipment is available at most aerodromes a fire extinguisher carried on the machine may make all the difference between an incident and an accident, though fires caused by any reason other than accidents (e.g., by engine back-fires—though even these are prevented nowadays by such devices as the Amal flame trap) are nowadays very rare.

Among firms who administer to this side of the aircraft owner's welfare may be mentioned Smith's Aircraft Instruments, Cricklewood, London (the Essex extinguisher); the Pyrene Co., Ltd., Brentford, Middlesex; General Fire Appliance Co., Ltd., 11, Queen Victoria Street, London, E.C.4; National Fire Protection Co., Ltd., Petersham Road, Richmond, Surrey; and Auto Fire Protection, Ltd., Abford House, Wilton Road, London, S.W.1.

ANTI-VIBRATION MOUNTINGS

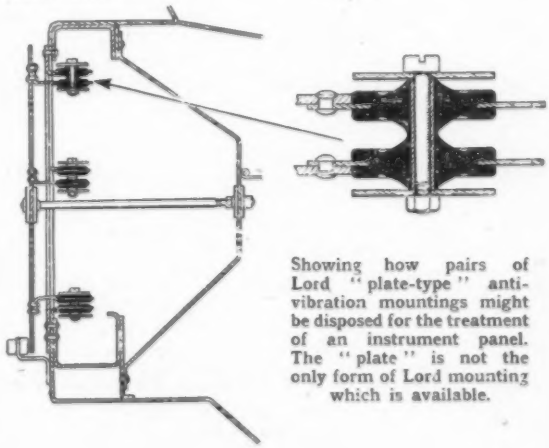
A NUMBER of new British aeroplanes are having their instrument panels fitted with Lord "plate-type" mountings as an anti-vibration measure. This type of mounting originated in the U.S.A., but is being handled in this country by the Sperry Gyroscope Company, Inc., of Great West Road, Brentford, Middlesex.

Not only must delicate aircraft instruments be protected against shock and vibration to maintain their accuracy and usefulness, but in many cases small mechanical installations must be insulated to prevent the transmission of vibration and mechanical noise to the surrounding area. It is claimed by the manufacturers that rubber has much greater ability to absorb vibration in shear than when stressed in any other way, and accordingly they have perfected a combination of resilient rubber and metal attaching members to make possible the shear type of rubber suspension.

Stable Suspension

The Lord shear-type mounting gives an initial tension to the rubber and is many times as stiff radially as axially. It permits a comparatively stable suspension in any desired direction, being very soft and having a low, natural frequency in the direction of the vibratory thrusts. At the same time, it is claimed, the hysteresis or internal friction of the rubber greatly reduces the amplitude at resonance and damps out repeated oscillations to a great extent. Not only are all kinds of vibration absorbed, but telephonic noise transmission is completely eliminated.

The plate-form mountings incorporate a washer-like metal plate, and a central metal tube, which are connected by rubber bonded to both. Thus the major vibratory thrusts are sustained in shear. The mountings are available in a wide range of capacities and in various shapes and sizes. There is the square plate with four corner-holes for fastening purposes; the round plate, applicable to special holders; and the stamped holder, which raises the mounting proper above the supporting surface. The raised periphery of the rubber itself forms a stop-cushion which prevents excessive movements when surfaces—usually flat washers—are adjacent to the ends of the central tube.



Showing how pairs of Lord "plate-type" anti-vibration mountings might be disposed for the treatment of an instrument panel. The "plate" is not the only form of Lord mounting which is available.

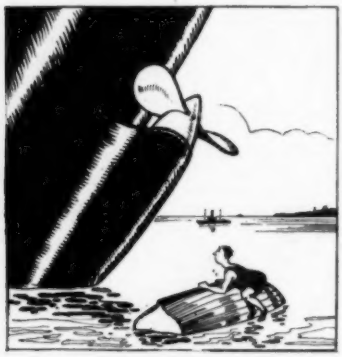
THE FUTURE of PRIVATE FLYING

When a Real Air Traffic Problem Develops, What Will be the Private Pilot's Place in the Scheme of Things?

By MAJOR R. H. THORNTON, M.C., M.A.

IF an amateur yachtsman in a dinghy loses his head in a squall and collides with the *Queen Mary*, the result will be a slight bump and possibly the yachtsman may be drowned. But supposing the collision would *automatically* involve the sinking of the *Queen Mary* with all hands, what would be the future for amateur yachting?

That seems to be the problem in a nutshell. Six years or so ago not only were aircraft few and far between, but there was little difference between the air-line pilot and the competent amateur. The former was merely more experienced and more skilled than the latter, but the technique of both was substantially the same. Today the two are in completely different categories, and the divergence between them is rapidly widening. We all know the reason. It is the perfection and the constant daily use of what are generically known as "blind-flying" instruments.



"... supposing the collision would *automatically* involve the sinking of the *Queen Mary* ... what would be the future for amateur yachting?"

There are three immediate and important consequences of this development:—

(1) Blind flying is not only suicidal but murderous, unless accompanied by two-way radio equipment for navigation and for information.

(2) If aircraft are to be free to fly as a matter of routine under conditions of nil visibility, then aerial collisions will occur with increasing frequency, unless the movements of all aircraft are controlled.

(3) Any such control is bound to demand from aircraft crews a high standard, not so much of skill, as of daily habit and practice, both in radio technique and sound airmanship.

"Elbow-room"

Let us also be quite clear about this. The air is by no means as big a place as it looks. The amount of "elbow-room" required for safety by a number of aircraft moving in miscellaneous directions at 150 m.p.h. is vastly in excess of that required by the same number of seacraft moving at, say, 15 m.p.h. The methods already in force for dealing with this problem in the area between London and the Channel ports are familiar. On a typical English day of low cloud and thick drizzle, the movements of all commercial aircraft over an area of 1,800 square miles, covering Kent and part of Sussex, are subjected to partial control. Worse than that, in order to ensure the safety of traffic connected with one city only, viz., London, an inner zone is established of no less than 600 *square miles*, within which the control of movement aims at being rigorous and complete. Into this zone no aircraft which is not equipped with two-way radio may penetrate. And it may be safely added that the only reason why the regulations permit amateur pilots, so equipped, to appear in that zone at all, is the simple one that such pilots don't exist!

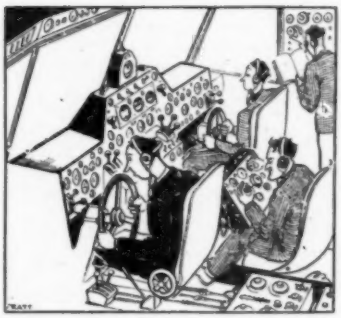
Q.B.I. conditions at Croydon are chaotic enough as it is. Schedules are ruined, connections lost, un-airminded businessmen are furious, and machines, fully loaded and due to start, may stand hopelessly on the apron for thirty minutes waiting for one machine to land. And that machine, mark you, is in the hands of a professional pilot, who is doing this kind of thing every day of his life. What on earth would happen if into the middle of this *galère* there sailed a cheerful stockbroker in a Hornet Moth, whose sole claims to inclusion in the party were fifty hours' solo and the possession of a costly radio set which he bought last Monday? Long before the coroner had even sat, a sweeping amendment to the *Air Pilot* would be on its way to the printers.

"... a cheerful stockbroker in a Hornet Moth, whose sole claims to inclusion in the party were fifty hours' solo and the possession of a costly radio set which he bought last Monday."

Major Thornton, the author of this very characteristic article, is a keen private owner who uses his machine for touring at home and abroad. Many readers of "Flight" must have enjoyed his wireless talk on this subject a few weeks ago, and those who were at the 1935 Air Transport Conference will recall his masterly setting-out of a scheme for the future reorganisation of air traffic. A Liverpool ship-owner by profession, he has no patience with narrow-minded nationalism, especially where it affects air travel. In the snapshot above, he is seen with Mrs. Thornton at last year's Magyar Pilota Picnic, to which he flew in his Hawk Major.

And this is merely *one* airport, handling in one day about as many passengers as Victoria Station handles in ten minutes, and it requires 600 square miles of close control over competent professional pilots. There are only 40,000 square miles in the whole populous area of England. You need only sixty-seven airports and the whole country is involved in similar conditions.

Obviously, the position will improve—technically. It has got to, if commercial aviation is ever to establish itself as a reliable form of all-weather transport. On the other hand, as reliability improves, so will traffic increase. We can foresee, therefore, a day when blind approach and landing are both possible and safe, but we must also foresee a day when, in order to maintain the normal flow of traffic in and out of a great airport without dislocation, the airway discipline under Q.B.I. conditions will have to be far more rigorous than it is. Aircraft will have to maintain height levels to far finer margins—say, 200 feet—and, on reaching a vertically funnel-shaped zone over their destination, to lose height in a prescribed manner with unfaltering precision. Five minutes' grace may perhaps be permitted for a blind, as against a visual, approach and landing. The thing can be done and will be done, but how? By the perfection of instruments we can already foresee, by the training of pilots to use them, by a highly skilled ground staff, and by *constant, daily co-operation* between the former and the latter.



"... a foolproof blind-flying set, a foolproof two-way radio set, and somebody's 'Nonpareil' radiaura installation consisting of eighty valves and about fifty armatures and whatnots ..."

Rail and Sea Parallels

And whatever may be the accuracy of the instruments and the skill of the personnel, we may be perfectly sure from what we know of other forms of organised transport that their effective value in practice will be about doubled by that last factor of habitual co-operation. Your amateur, therefore, even though a fine natural pilot and a radio enthusiast as well, will never be able to reach a factor of more than 50 per cent. of the prevailing efficiency on a busy airway. Take a man of reasonably quick intelligence, give him a six weeks' course in the theory and practice of block-signalling, and then put him in a main-line cabin on a Bank Holiday. Could he hope to equal the gentleman who left school at fourteen but has been signalling for twenty-five years? If you were master of a ship, making a port at night with a nasty cross-tide running, would you rather have to help you a senior wrangler, who knows all there is to know about navigation, or a young man who has been at sea for eight years and can take three bearings, slip into the chartroom, plot them and give you a "fix"—all in the space of about two minutes? And how many amateurs, anyhow, are ever going to be fine natural pilots and radio enthusiasts? We have no right to expect an aeroplane to become a foolproof vehicle. Even when it can land with no forward speed, it will still be a vehicle in which a fool can do an immoderate amount of murder. Neither can we expect instruments to become foolproof. However wonderful they may be, they will require reading and co-ordinating. The air-line pilot today, by habit and practice sits happily in his seat confronted by an array of dials that would turn you or me dizzy. At the opposite end of the scale you have the young woman who had been flying behind a Gipsy Major engine for *six months* and force-landed one day in a panic because her oil-pressure gauge read "40"; there will always be such people, and the more "popular" flying becomes, the more of them there will be.

It may be argued that Q.B.I. conditions are not always with us. True, but first they descend upon us without warning, and second we must remember that the faster the speed of aircraft the higher will be the standard of minimum visibility required for uncontrolled movement. Machines at 210 m.p.h. will approach each other at the rate of seven miles a minute, which on the existing Q.B.I. standard of 1,000 yards would give their respective pilots five seconds in which to become aware of each other (they might be looking at a petrol gauge!), to size up angles of approach, decide what to do and get their machines to do it—of course, without sideslipping the passengers' lunch into their laps.

The "radiaura" will no doubt solve this little problem for you, but you observe that every problem requires yet another instrument and someone to keep that instrument in working order. The more complete our conquest of the air, the more expensive it seems to become. By the time every aeroplane has, as a matter of course, a foolproof blind-flying set, a foolproof two-way radio set, somebody's "Nonpareil" radiaura installation, consisting of eighty valves and about fifty armatures and whatnots, and finally a whole spare engine and propeller thrown in for luck, the advent of cheap "popular" flying will be as far off as ever.

Wanted—Low Minimum Speeds

Or so it would seem. However, my own personal view, for what it is worth, is that this approach to the problem is somewhat unreal, because I just don't believe that the man in the street will ever be found indulging in blind flying, super-cloud navigation and instrument landings. He just won't be bothered to study and keep abreast of the intricate regulations of the "Airway Code," and the various technical examinations, W/T licences, etc., that he will have to pass will seem to him far too much like work, and in most cases also beyond his competence. He will not get into the air in any numbers until he can fly in safety with one foot on the ground. When Mr. Cierva or somebody else gives him a cheap aeroplane with a speed range from 15 to 100 m.p.h. and a water-cooled motor, he will use it. In dirty weather he will fly low and he will fly slow. He will never hit an air liner because it will not be there for him to hit. His navigation will be mostly of the map-reading variety and, incidentally, his map will be plastered with "Airport Zones" into which his entry will be strictly forbidden.

Adding to Air Hire

YET another machine, a D.H. Hornet Moth of the 1936 square-tipped order, has been added to Air Hire's fleet, which now numbers six. The Hornet will be hired at a rate of £4 15s. a day, including insurance cover, or at £4 4s. for periods of three days or more.

Incidentally, it may not be generally known that this company is prepared to hire any machine, whether on their fleet or not, for long periods at special rates. Several firms are interesting themselves quite seriously in this proposition, which allows them to gauge the value of aircraft ownership.

Mr. W. H. Mace Joins British Marine Aircraft

IT is announced that Mr. W. H. Mace has joined the Board of British Marine Aircraft, Ltd., as works director, and will be in charge of the new works now being erected at Hamble, Southampton.

Mr. Mace has been for many years works manager of Hawker Aircraft, Ltd. Previously he was a member of the A.I.D., Air Ministry.

His wide experience, especially in metal construction, should be of the utmost value in the production of the British Sikorsky S 42-A.

LIGHT AIRCRAFT POWER UNITS

A Review of the Engines Available for Private-Owner and Similar Machines : Low Maintenance Cost and Economy in Operation the Features of Many Types

THEIR all-round excellence has established a name for British light aero-engines in every country where privately owned aeroplanes are flown. Not only are they exported in British airframes, but there is a continual demand for them to power foreign aircraft.

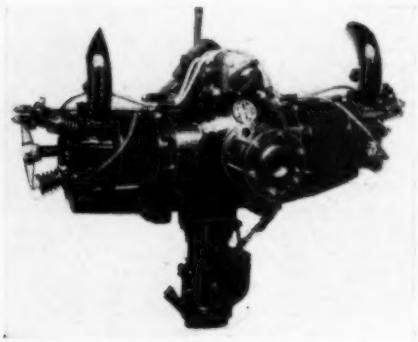
British designers have been flattered during the past few years by the widespread copying of features which have popularised their engines: the lead they have maintained since the first few enterprising minds took to the air not only for mental stimulation, but to save their valuable time, has never been decreased.

The best-known models which are suitable for privately owned aircraft are described briefly hereafter.

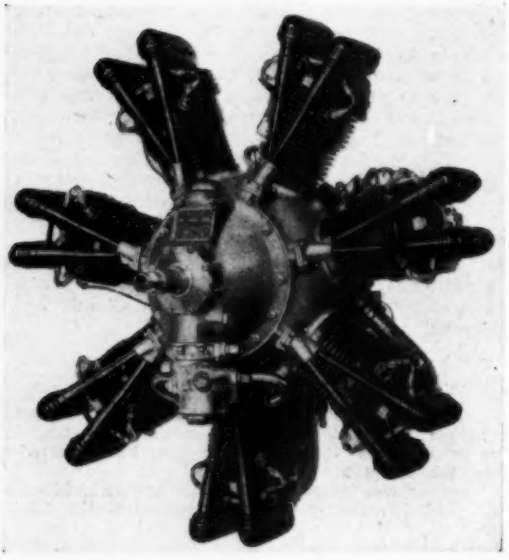
A.B.C.

Of a type which is now in the limelight due to the "ultra-light" revival, the little A.B.C. Scorpion Mk. II is a twin-cylinder horizontally opposed air-cooled engine delivering 34-40 h.p. Both tractor and pusher installations are possible with this unit. It is of straightforward layout with cast-iron cylinder heads, steel barrels, and two valves per cylinder.

(Makers: A.B.C. Motors, Ltd., Walton-on-Thames, Surrey.)



The flat-twin A.B.C. Scorpion Mk. II gives 34 h.p. at 2,300 r.p.m.



A popular Siddeley type is the Genet Major Mk. IA. which gives a maximum of 165 h.p. and weighs 327 lb.

AERO ENGINES

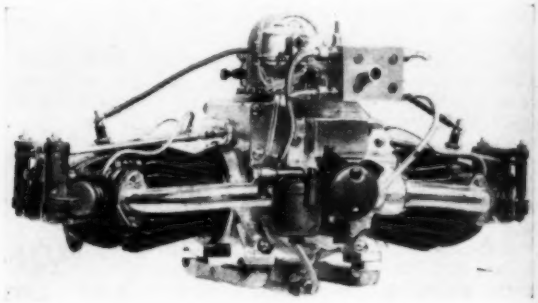
Popularly known as the Aero Douglas Mk. II, the 24h.p. air-cooled flat twin manufactured by Aero Engines, Ltd., has distinguished itself particularly in the B.A.C. Drone. The engine is of 750 c.c. capacity and delivers a maximum of 22.5 h.p. at 3,150 r.p.m. At an early date this model will be superceded by the Mk. III version, which has its fins set across the cylinder barrels instead of longitudinally. The power will be 25.5 h.p. at 3,300 r.p.m. An improved oil pump is specified.

(Makers: Aero Engines, Ltd., Kingswood, Bristol.)

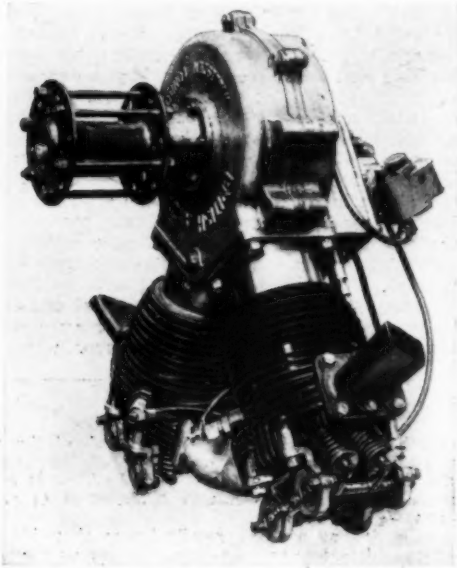
ALTA

The name Alta is as yet strange to the ears of private owners insofar as aero engines are concerned. In the near future, however, it may find its way into aeronautical parlance in connection with the little Alta air-cooled flat twin now going into production. This produces 36 h.p. at normal cruising revs. (2,800) and 47 h.p. for take-off at 4,000 r.p.m.

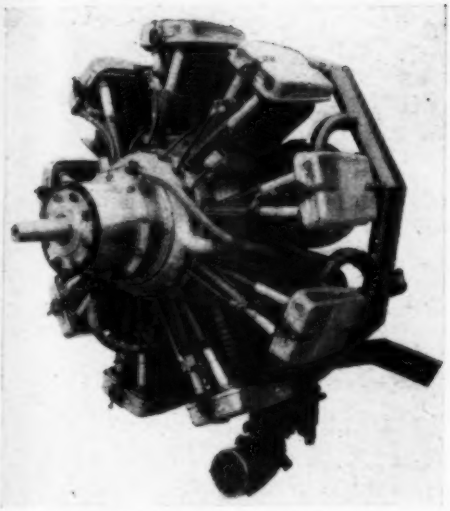
(Makers: Alta Car and Engineering Co., Tolworth, Surrey.)



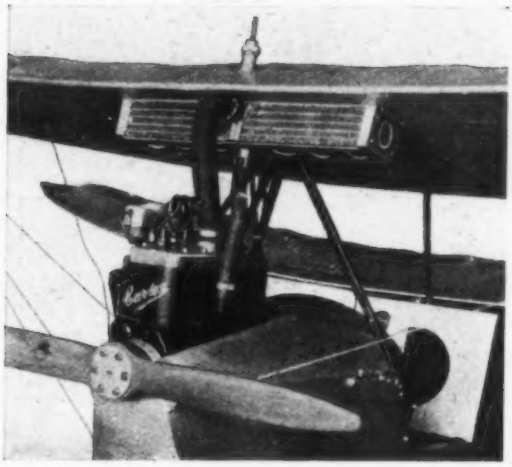
The Aero Douglas Mk. II seen here is soon to be superseded by a new type giving 25.5 h.p.



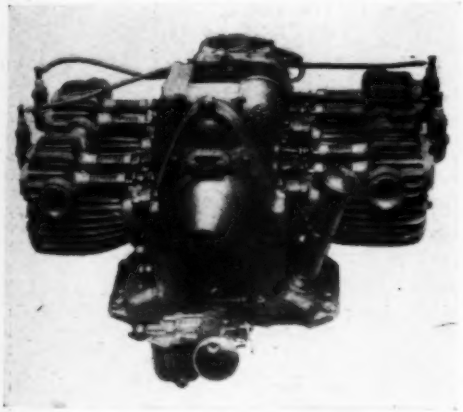
The 34 h.p. British Anzani inverted twin can be supplied with gearing if desired. The direct drive version is shown.



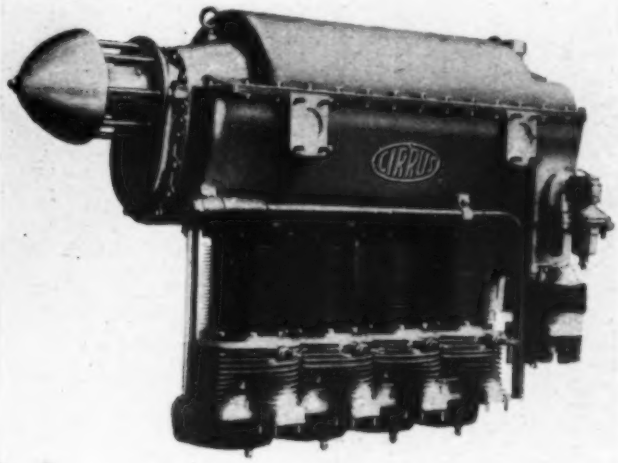
This is the British Salmson A.D. 9R Series II geared radial of 70 h.p. It weighs 185 lb.



Showing how neatly the little water-cooled Carden engine (30 h.p.) can be installed in a *Pou-du-Ciel*. (*Flight* photograph.)



This view of a modified version of the standard flat-four Coventry Victor gives some idea of the appearance of the forthcoming aero engine.



One of the two Cirrus-Hermes types now in production is the Major, of 135 h.p. It is a new design and weighs 310 lb. The 82 h.p. Minor is the second of the Cirrus types. Two Minors use no more petrol than one Major.

ARMSTRONG SIDDELEY

The best-known Siddeley engine among private owners is the seven-cylinder Genet Major radial. In its latest form, when it is known as the Mk. Ia, this engine is normally rated at 150 h.p., although it is capable of delivering 165 h.p. at full throttle. The weight is 327lb. It is widely fitted in trainers, like the Avro Cadet.

A larger type, the 214 h.p. Lynx, is not unknown among private flyers. It gives a maximum of 240 h.p. and is admirably suited to comfortable four-five seater touring machines.

(Makers: Armstrong Siddeley Motors, Ltd., Parkside, Coventry.)

BRITISH ANZANI

An interesting contribution by the British Anzani company to the "ultra-light" movement is the 34 h.p. inverted vee twin. An air-cooled type, it is of 1,100 c.c. capacity, and is available in geared or direct-drive forms.

(Makers: British Anzani Engineering Co., Ltd., Kingston-on-Thames, Surrey.)

BRITISH SALMSON

Two small British Salmson engines suitable for private operation are in production at the moment. Both are nine-cylinder radials, and they are known as the A.D.9 (50 h.p.) and the A.D.9R Series II (70 h.p.). The maximum powers are 54 h.p. and 76 h.p. respectively.

(Makers: British Salmson Aero Engines, Ltd., Raynes Park, London, S.W.20.)

CARDEN

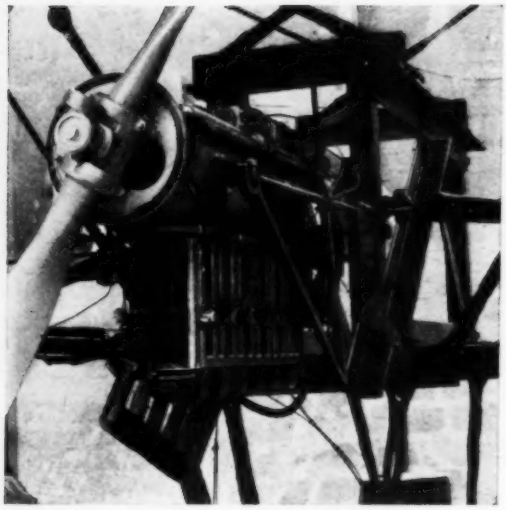
One power unit which is proving popular for installation in the "lightweights"—particularly *Poux-du-Ciel*—is the Carden. Based on the 10 h.p. Ford car engine, this unit, which gives a normal power of 30 h.p., is specially fitted with aluminium cylinder heads, dual ignition, and embodies other detail refinements. It is, of course, water-cooled, but can be fitted neatly into the nose of a *Pou*.

(Makers: Carden Aero Engines, Ltd., Heston Airport, Middlesex.)

CIRRUS-HERMES

For years past few proper nouns have figured more prominently in the private owner's vocabulary than "Cirrus." The Cirrus-Hermes Engineering Company intends to see that the name remains there by producing two new engines, known as the Minor and Major. Both are of the popular inverted four-cylinder air-cooled variety, but their powers are 82 h.p. and 125 h.p. A batch of fifty Minors is now going through the shops. The respective weights of the two units are 195 lb. and 310 lb. Two Minors consume no more petrol than one engine of the Major class, but they give a total output of 33⅓ per cent. more power. The Minor will soon appear in a number of new machines.

(Makers: Cirrus-Hermes Engineering Co., Ltd., Brough, Yorks.)



The De Havilland Gipsy Six will soon be available with the De Havilland variable-pitch airscrew. Such a combination is here seen on the test bed. (*Flight* photograph.)

COVENTRY VICTOR

A "flat-four" is being offered by Coventry Victor for use in *Poux* and kindred light aircraft. It is essentially a development of the standard Coventry Victor Neptune flat-four engines, but has a special Elektron crank case, a stronger thrust bearing on the crankshaft and a special B.T.H. magneto. In its side-valve version the unit weighs approximately 120 lb., and develops 25-30 h.p. at 2,500 r.p.m. The endeavour of the makers has been not to make a "pukka aero job," which would cost about double, but rather to put a suitable engine in the reach of *Pou* enthusiasts.

(Makers: The Coventry Victor Motor Co., Ltd., Coventry.)

DE HAVILLAND

Neatly-cowled noses bearing inverted Gipsy engines are every day sights at all British aerodromes patronised by private owners. Two main Gipsy models are standardised at the moment. They are the Major and the Six—both inverted air-cooled in-line designs with four and six cylinders respectively. The powers are 130 h.p. and 200 h.p., and the weights 300 lb. and 468 lb. Before long one version of the larger engine will be available with facilities for the use of a De Havilland-Hamilton controllable-pitch airscrew. This model will be known as the Gipsy Six Series II and will give a higher continuous power output than the standard type.

(Makers: The De Havilland Aircraft Co., Ltd., Hatfield Aerodrome, Hatfield, Middlesex.)

NAPIER

The Rapier engine produced by this company may be regarded as something of a luxury type for the private owner. One was fitted in an Airspeed Courier and conferred a fine performance upon that machine. The Rapier VI is a typical modern example of this engine. It is rated at 360 h.p. at 4,000 ft. and weighs 707 lb. The sixteen cylinders are arranged in four banks of four, in the form of an "H."

(Makers: D. Napier and Son, Ltd., Acton, London.)

POBJOY

The Pobjoy radials, in the early days of their existence, which is but a few years ago, distinguished themselves particularly in sporting machines. To-day they power not only sports and training types but comfortable tourers. Probably the most familiar model is the Niagara, used at present in its Mark II form. It is a geared nine-cylinder radial giving a normal power of 84 h.p. at 3,200 r.p.m. Ninety horse-power is available at full throttle. The weight, at 150 lb., must be considered abnormally low for an engine in its category. Cowling, of the modern long-chord type, is supplied as an integral part of the engine. Other Pobjoy models are the 65 h.p. Cascade (direct-drive) and the Cataract of 75 h.p.

(Makers: Pobjoy Airmotors and Aircraft, Ltd., Rochester.)

The most widely used Pobjoy model is the Niagara, which gives 84 h.p. at normal r.p.m. (3,200). Gearing is, of course, incorporated.

SCOTT

A product of a firm which has had long experience in the design and construction of light two-stroke engines, the Scott Flying Squirrel unit is eminently well suited to ultra-light aircraft. Already it has been installed in a number of *Poux-du-Ciel*. It is an inverted air-cooled type with its two cylinders arranged in line. Maximum power (34 h.p.) is developed at 5,200, necessitating reduction gearing with a ratio of two-to-one. The normal output is 16 h.p. at 2,800 r.p.m. and the weight 85 lb.

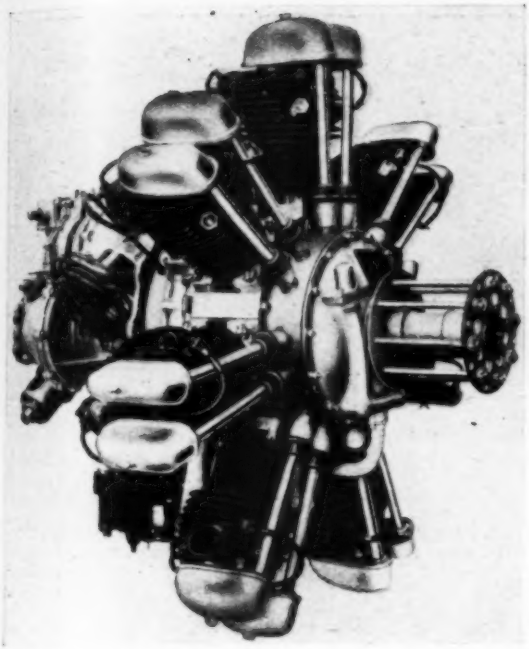
(Makers: The Scott Motor Cycle Co., Shipley, Yorks.)

VILLIERS-HAY

The Amherst Villiers Maya aero engine, which is fully described on pp. 427-428 of this issue, has recently been tested under Air Ministry supervision, and should soon be mounted in an aeroplane for flight tests. It is a four-cylinder, inverted, air-cooled in-line engine designed to run 1,000 hours between major overhauls. Its normal rating is 120 h.p. at 2,300 r.p.m., and the maximum power 130 h.p. at 2,600 r.p.m. The weight is 275 lb.

(Makers: Villiers-Hay Development, Ltd., 48, Albemarle Street, London, W.1.)

The Scott Flying Squirrel is particularly suitable for *Poux-du-Ciel*. At 2,800 r.p.m. (normal) it gives 16 h.p., but at 5,200 r.p.m. the power is 34 h.p. (*Flight* photograph).



The Wolseley Aquarius Mk. I is the smallest unit of the Wolseley range. It is rated at 155 h.p. (maximum 170 h.p.) and weighs 375 lb.

WOLSELEY

Each of the three engines in the present Wolseley range should interest somé kind of private owner. The units concerned are the Aquarius Mark I (155/170 h.p.), the Aries Mark III (205/225 h.p.), and the Scorpio Mark I (230/250 h.p.). All are single-row air-cooled radials, but the Aquarius has five cylinders and direct drive, whereas the remaining two models are nine-cylinder types and are geared. Other models under development at the moment include the Scorpio II (2,500 h.p. at 5,000ft.), the Leo (280 h.p. at 6,000ft.), and the Libra (390 h.p. at 6,000ft.).

(Makers: Wolseley Aero Engines, Ltd., Birmingham.)

Engine Accessories

WHEN one hears of the reliability or outstanding performance of a certain aero engine one is apt to attribute the quality of the unit solely to the firm whose name it bears, forgetting in a wave of enthusiasm the supreme importance of sparking plugs, magnetos, carburetters, and kindred items which may be classed as "equipment" rather than constructional components and material (which were reviewed in *Flight* of December 5 last). The British private owner can count himself fortunate not only because of the peerless quality of his engine accessories, but for the servicing facilities offered.

The K.L.G. Co., of Putney Vale, who make a range of plugs in the 12 mm., 14 mm., and 18 mm. sizes, has played its part in many of the most notable British flights, such as Flt. Lt. Tommy Rose's Cape trip in the Miles Falcon.

Lodge aviation plugs, produced by Lodge Plugs, Ltd., of Rugby, are manufactured in all the standard sizes, and are to be found beneath innumerable cowlings. They were among the items which contributed to the success of Mr. Llewellyn's South African flight in the Aeronca.

The B.T.H. magnetos, electric starters, and electrically driven compressors, particularly, of course, the former, are other blessings.

H. M. Hobson (Aircraft and Motor) Components, Ltd., are responsible for the famous Claudel Hobson carburetters.

Magnetos, direct-cranking electric starters, and engine-driven generators represent but a fraction of the accessories offered by Rotax, Ltd., of Willesden Junction, London, N.W.10.

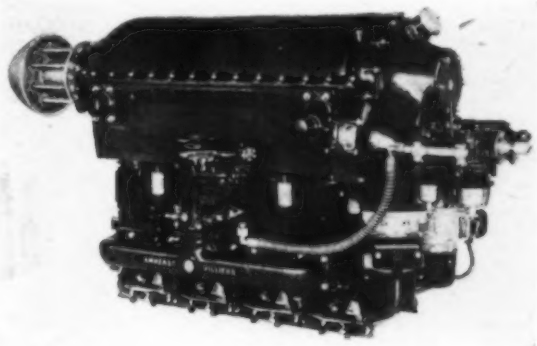
No fewer than five types of fuel pump are made by Amal, Ltd., Perry Barr, Birmingham, 20, while A.C. Sphinx fuel pumps (The A.C. Sphinx Co., Dunstable, Bedfordshire) are found in a number of leading makes of light aircraft engines.

The Auto-Klean filter (made by Auto-Klean Strainers, Ltd., of Tower House, Trinity Square, London, E.C.3) is finding ever-increasing employment, and has figured in recent record flights.

Tecalemit, Ltd., Great West Road, Brentford, make ultra-low-weight fuel pumps, filters for fuel and oil, and air cleaners.

Fuel and oil-pipe problems can frequently be solved with the aid of Petroflex, marketed by Smith's Aircraft Instruments.

Airscrews, also, come under the heading of "optional" equipment as regards make and type in the case of many light aircraft. The rival claims of metal and wooden airscrews are well known, and few people need reminding that the former are represented by the Fairey airscrew, handled by the Fairey Aviation Co., of Hayes, and the latter by the products of the Airscrew Co., of Weybridge, which have the remarkable Schwarz patent finish. Then there is the V.P. airscrew, as produced in this country by the De Havilland Company, while a Schwarz design of this type is on the way, and will, no doubt, duly be produced by the Airscrew Company.



The Villiers-Hay engine, a description of which appears on pp. 427-428.

FOURFOLD

MEMBERS of the Brooklands Associated Flying Clubs foregathered at the Park Lane Hotel, Piccadilly, last Saturday evening for the Annual Dinner and Dance. Lt.-Col. Sir Francis C. Shelmerdine presided, and read a telegram of good wishes from Holland which gave much satisfaction.

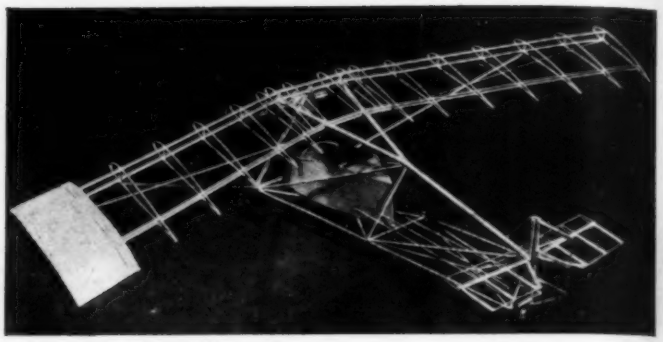
In proposing the toast of "The Four Clubs," Brooklands, Lympne, Sywell and Shoreham, he said that the history of Brooklands was practically the history of aviation, for it had reached the advanced age of twenty-seven years. The Brooklands Aero Club was, he thought, the oldest club, and he recalled with appreciation the pioneer work of Col. G. L. P. Henderson and Teddy Jones. They were celebrating that evening the union of other clubs with Brooklands, and mentioned that Lympne, from small beginnings, had become one of the most successful clubs in the country. Sywell, always difficult, was now going ahead under the Brooklands ægis. He congratulated Brooklands and particularly, Captain Duncan Davis, on their progress and the work of national importance which they were performing. Flying clubs had another year to run under the Government subsidy scheme and Col. Shelmerdine said that he, personally, was quite satisfied that clubs would continue to receive the greatest official support.

Capt. Duncan Davis, who was received with great acclamation, reviewed the early beginnings of the club in an amusing speech and recalled how he, together with a few pupils and friends, bought the school from Col. Henderson in 1927 for £3,000. There had been times when the wages were short but they had won through. He mentioned with particular gratification the help and support they had received from Dame Ethel Locke-King, and the appointment of Mr. A. P. Bradley marked the turning point in their career. They had now first-rate hangars, the aerodrome had been drained, and soon, with the improvements being effected, they would have one of the best aerodromes around London.

The toasts of Dame Ethel Locke-King, Col. Sir Francis Shelmerdine, Capt. Bush and Guests were drunk enthusiastically.

THE £100 AEROPLANE

Mr. Pemberton Billing's Return to Aviation : A Machine with Welded Bicycle-tube Construction : Fittings Suppressed Altogether : Typical "P. B." Unorthodoxy



A scale model of the Pemberton Billing Skylark's "skeleton." All joints are welded. (*Flight* photograph.)

QUITE early in British aviation history, somewhere about 1912 or 1913, there lived on board a three-masted schooner moored in the River Itchen a man who had been badly bitten by the "aviation bug." At Woolston, in a very modest works, a few other enthusiasts were hard at it trying to translate into actuality the ideas which came to our friend on the schooner during the long watches of the night. In time, a flying boat with frames of circular section and a built-on step began to take shape. A rotary engine (Gnome) was fitted in the gap, its axis tilted to direct the slipstream on to the tail-plane, so that when the high centre of thrust should disappear with the stopping of the engine, the disappearance of the slipstream should reduce the download on the tail, thus evening matters up again.

The man who visualised all these features was the founder of the Supermarine Aviation Works, and his name was destined to become associated with many phases of early British aviation. Noel Pemberton Billing was the man, and among those who were associated with him from the start was Mr. Hubert Scott-Paine, who was later to become Mr. Pemberton Billing's successor and to whom fell the task of consolidating, with Commander James Bird, the foundations on which later Supermarine greatness was built.

Some Early "P. B." Efforts

It is, perhaps, significant that the flying boat referred to was known as the P.B.3. Two designs had preceded it, but had not been built. This one did not fly, but that was an incidental fact shared by not a few early aircraft. The right ideas were there, but not, so to speak, in the correct proportions. Facts and figures for correlating the ideas were still to be dug out laboriously, and engines of 100 horse-power were something of a rarity.

Before he abandoned aviation to go into politics "P. B." had many more brainwaves. There was, for example, the height indicator for use when alighting in the dark, a weight suspended below the flying boat and warning the pilot, as it struck the water, that it was time to flatten out. There was the design, much ahead of its time, of a flying boat in which, if engine failure caused a descent on the sea, the wings were allowed to float away and the hull proceed as a motor boat, unhampered by a superstructure. There was what *Flight* of those days called the "Seven-day 'Bus," a little biplane said to have been designed, built and flown within a week. There was the quaint little pusher machine which became known as the "Push-Prodge," and there was an equally unorthodox quadruplane, a military type with gun turrets and other things which would seem quite modern to-day.

"P. B." was ever unorthodox and was always doing the unexpected When, therefore, he rang up *Flight* a few days ago and asked if we were interested in an aeroplane that could be sold for £100, or for £125 including tuition, we were slightly sceptical, but not surprised. It was so exactly like "P. B." to spring one like that on us. Within the hour he had turned up at *Flight's* offices, had explained his new aeroplane, had shown us just about the neatest all-purpose camera in the world (produced from a watch pocket), had had the model of his aeroplane photographed, and had left us dazed and somewhat wondering.

"P. B." is no believer in the *Pou-du-Ciel*, but he *is* a believer in the small, cheap aeroplane. He is about to demonstrate his belief by marketing one. The Pemberton Billing Skylark, as was to be expected, is not quite like any other aeroplane ever built, although it has most of the orthodox features, wings, a tail, an undercarriage, a cockpit, and an engine. But these ingredients are mixed in an unusual way, and held together without fittings, and almost without bolts. One expects "P. B." to have an amusing time with the Air Ministry airworthiness people in connection with his plain welded joints without reinforcing of any sort.

Welded tubular wing spars to which are welded the tubular steel ribs form the basis of the wing. The rest is a plain covering of sheet aluminium, simply screwed to spars and ribs. The back-swept wing is strut braced to the front spar only, the sheet metal covering being relied upon, in conjunction with the welded joints of the ribs, to transmit loads from rear to front spar. There are no ailerons. "P. B." admits that he may have to add them afterwards. At present he does not wish to, as they mean weight and cost. The elevators are intended to take over the usual aileron duties, being independently hinged and so geared to the controls by pull-and-push rods that one can be made to move up when the other moves down. In addition they retain their natural elevator movement. "P. B." points out that, after all, the *Pou-du-Ciel* flies without ailerons, so he ought to be a little better off.

To transmit torque of this nature from the tail to the wings will demand a very rigid tail girder. The triangulated welded structure of the model was found to be amazingly stiff in torsion, so that possibly the full-size machine may be satisfactory in this respect.

The Undercarriage

The undercarriage is of the simplest imaginable type: Each wheel is carried on a stub axle, and as the telescopic strut is a part of the main aircraft structure, there is no difficulty in providing a very long stroke, two feet, if it is thought necessary for really clumsy landings. The wheels seem too far forward to get the tail up during take-off.

It could scarcely be claimed that the Skylark is a pretty aeroplane, but as "P. B." points out, it is designed for cheap flying and not for high performance. Fairing and streamlining has had to go by the board.

A Douglas engine is foreseen for the experimental machine, but afterwards there may be a "P. B." aero engine specially produced for the Skylark.

Bicycle tubing is the material which has been selected for the construction of the Skylark. All the tubing used in the machine will weigh about 140lb.; engine, tanks and petrol, another 140lb.; the nacelle about 25lb.; wing and tail covering, undercarriage and controls another 125lb. With a pilot of 170lb. the loaded weight of the Skylark is estimated at 600lb. or so. The wing area is 112 sq. ft., and the wings are bolted to the centre-section by 8 bolts. For hangarage, or for towing behind a car, they are stacked along each side of the tail girder, when the overall width is about 6ft. When spread, the wings have a span of 29ft.

One gathers that a company is to be formed for the production of the Skylark in quantities. A good deal of thorough testing of the first machine will be needed before the many unorthodox features can be considered welded (literally) into a trustworthy whole.

Private Flying

Topics of the Day

Not So Blind

NOWADAYS when I fly a machine in which there is no turn indicator I feel rather as I would have done six years ago if no air speed indicator had been fitted. The instrument had become part of my "dashboard consciousness," and probably in days to come such things as rate-of-climb indicators and radio homing needles will fill equally useful psychological functions.

Only a born idiot would set off into really thick weather with a single engine and with no radio equipment, so the turn indicator is certainly not a vitally necessary part of one's equipment. It is, however, vitally comforting.

Apart from its definite value as a check on accurate flying, there are times when the weather, though safe enough, is such that the "horizon" appears just below the leading edge, and a turn indicator is then very useful indeed as a means of holding an accurate compass course until such a time as matters improve.

A Safety Accessory

IF you are very unlucky you might fly without warning into heavy rain, very thick weather, or even into snow if you are flying in the winter. You may decide to turn back, to carry on with the knowledge that the trouble is purely local, or to climb up through it, if the worst comes to the worst, in the hope that a gap will appear in due course.

In each case a blind-flying instrument would be absolutely essential to safety. The mere act of turning in conditions of no visibility and without such an instrument will almost inevitably land you in an attitude from which there might be little or no time to recover after the ground had come into view again.

Knowing all about cloud-flying areas and so on, I hesitate to recommend the instrument as one which enables the earnest pilot to climb up through the clouds in dull weather in order to enjoy the effect of a little sunshine! Nevertheless, I do it fairly often, feeling that the very minor risk of collision is amply balanced by the ecstatic sensations of flying above a smooth cloud layer. One can always make the necessary enquiries to ensure that no machines from one's own aerodrome, at least, are playing in the high-level fog. Anyway, don't forget to time yourself up and down wind for periods worked out according to its strength, or you may emerge over terrifyingly strange country.

Worth Trying

PRACTICALLY every club and school in the country now runs a standard instrument-flying course, and I would advise every amateur to do at least a few hours under the hood. At the termination of a couple of hours of instruction the normally apt pupil should be able to fly straight, to make "blind" turns on any compass course and to recover from a spin.

Through lack of really strenuous practice under an instructor's eye, my course-keeping in a cloud is now a trifle erratic, and the speed tends to jump about a little unless the machine is reasonably stable in its fore and aft axis. But I have learnt to believe implicitly in the instruments—and that is 90 per cent. of the battle. I have always claimed that a person who had had no training at all in this type of work can still fly blind in fair safety if he concentrates on the job of keeping the turn needle central and disregards all his natural sensations. Needless to say, neither his course nor his speed would remain constant, but he would not get into any serious trouble.

The fact that I am ten degrees or so off my original course after five minutes in a cloud does not worry me as it might if I took the matter really seriously, though I sometimes practice "blind" turns for the good of my soul. Incidentally, if you want to discover just how stable an aeroplane *can* be in an unnatural attitude, try a few flat turns—holding rather more rudder than usual and keeping the stick slightly but firmly over against the bank.

Valuable Training

WHATEVER happens, and however he may perspire with the unwonted mental effort under the hood, the amateur will learn some extremely valuable things about, for instance, the behaviour of a compass on different courses, and will probably find himself becoming so enthusiastic about the whole business that he will complete the course against his original wishes.

There must be few feelings of sheer triumph equal to that experienced by a pupil who, after making a tedious triangular flight, lifts up the hood and sees the home aerodrome within easy gliding distance. I know how I feel when, after twenty minutes spent in and above the clouds, the machine emerges over a predetermined point.

After taking such a course the amateur will at least take a great deal more notice of his drift allowance and of his watch than he did before—and that is surely a good thing for all concerned. When the weather is fine it is such a temptation to drift along near railway lines and to use one's compass merely as a vague check on the direction of travel.

Those who go in for Bradshaw-flying can never have realised the fun of discovering that one's calculations are turning out to be right, or discovered that the triple check of map, compass and watch can relieve one's mind to no small extent when the weather is closing in or darkness falling a little earlier than was originally expected.

INDICATOR.

Private Flying

FROM the CLUBS

Events and Activity at the Clubs and Schools

TOLLERTON

GALES and hailstorms during the Easter week-end occasioned some disappointment: 23 hr. were logged from Friday to Monday. For the week ending April 16, flying time was 31 hr. 50 min.

Address: The Nottingham Flying Club, Tollerton Aerodrome, Nottingham.

PORTSMOUTH

Miss P. Chapman and Mr. I. E. Yeates became members during the week ending April 17, when the flying time was 21 hr. 15 min.

Address: Portsmouth Aero Club, Ltd., The City Airport, Portsmouth.

C.A.S.C.

Members flew 4 hr. 30 min. dual and 5 hr. 35 min. solo last Sunday. Mr. S. C. Brown went solo and six members flew over to Hatfield for tea.

Address: Civil Aviation Service Corps, Fen Ditton Aerodrome, Cambridge.

LIVERPOOL

A "nor'-easter" over the Easter holidays had a serious effect on flying. For the week ending Thursday, April 15, the returns total 30 hr. 15 min.

Address: The Liverpool and District Aero Club, Hooton Park Aerodrome, Sheffield.

MIDLAND

First solo flights were made during the past fortnight by Messrs. P. Danielsen and J. Jack-on. Mr. T. Pullin passed his "A" licence tests. The flying times for the fortnight were 26 hr. 25 min. dual and 24 hr. solo. New members include Messrs. R. G. Hirst and G. R. Edge.

Address: Midland Aero Club, Ltd., Castle Bromwich Aerodrome, Birmingham.

WITNEY AND OXFORD

High winds held up solo flying during the week ending April 18: the flying times total 21 hr. Witney Aerodrome has been added to the list of recommended schools for W/T and R/T courses by the Signals Department (Civil Aviation) London (Croydon) Airport.

Address: Witney and Oxford Aero Club, Witney Aerodrome, Minster Lovell, Oxford.

BORDER

Until the Easter holidays the Club had good weather and Mr. Porter went solo. Five other "solo" members put in time practising for their "A" licences. Snow and hail on Friday curtailed flying. Mr. Todd became a member last week and Mr. Muirhead was made a visiting member. The Carlisle-Isle of Man service of British Airways was resumed on Monday, April 20.

Address: The Border Flying Club, Ltd., Carlisle Aerodrome, Kingstown, Carlisle.

SOUTH COAST

Although the wind has been high for instructional work, flying has been quite up to the average. A large party from Shoreham went to the Brooklands Group dinner at the Park Lane Hotel on Saturday. The Monospar was demonstrated on Sunday. Mr. R. Thompson went solo and passed his tests for his "A" licence during the week. New members include Messrs. Hales, Cook, Campbell-Bruce and Carr.

Address: South Coast Flying Club, The Airport, Shoreham, Sussex.

BRISTOL

For the week ending April 11 flying time was 39 hr. and during the following week 28 hr. Messrs. J. L. N. Pollock, R. Burt and M. Edkins became members and Mr. D. E. J. Aslin transferred to Pilot membership. The B.A. Swallow G-AEAU is again in commission. A Monospar will be demonstrated on April 25. An anonymous donor has presented the Club with a prize of £10 for a cross-country competition.

Address: The Bristol and Wessex Aeroplane Club, Ltd., Bristol Airport, Bristol.

LONDON

The flying done by members while away during the Easter holidays and during the period since the Club reopened was 49 hr. 25 min. New members are: Lt.-Col. C. V. Bennett, Col. M. Maxwell, C. Rowland Hodgson, L. C. Cutbill, C. R. Beverley, C. V. Smith, T. Blanks, J. F. Marsh. On Sunday there were two strange arrivals at Hatfield in the form of sailplanes from Dunstable. Both pilots were out it appears after their "silver C" licence which involves a 30-mile cross-country flight, but were unable to get farther than Hatfield. The machines were dismantled and in due course wheeled away in covered wagons.

Address: The London Aeroplane Club, Hatfield, Herts.

REDHILL

Flying time for the week ending April 17 was 55 hr. 25 min. Mr. J. Bull went solo, Mr. A. Auping made his "B" licence night-flying test, and Mr. M. A. Blount completed his "B" licence tests.

Address: Redhill Flying Club, Ltd., Redhill Aerodrome, Surrey.

HANWORTH

In spite of the very bumpy weather during last week the flying time logged at Hanworth was 40 hr. 20 min. Mr. Whitney Straight hired the Club's Monospar on Friday, flying to Plymouth and returning on Saturday. Mr. McLelland received cross-country instruction to Shoreham, Tangmere and return. Mr. C. Burge, one of the first of Hanworth's members, has returned, bringing with him a Redwing. Some very amusing flying was carried out during the week by the Club for a film featuring Claude Hulbert in "Interrupted Honeymoon."

Address: London Air Park Flying Club, Hanworth Aerodrome, Feltham, Middlesex.

BROOKLANDS

The main point of interest at Brooklands last week was the washing-out of the landing fees, which had been somewhat unpopular with visiting pilots. New members are Mr. Cain, Mr. J. Mercer and Miss Young. Mr. R. Callingham went solo after only four hours' instruction and completed the tests for his "A" licence within the fortnight.

An International Air Rally will take place at Shoreham Airport on June 13 and 14, which is the official opening date of the Airport. There will be an arrival competition for which the first prize will be £50, and also a race over a closed circuit of about fourteen miles, for which the prizes will be: First prize a Cup and £50; second prize, £25; and third prize, £10.

[A report of the Four-Club dinner appears on page 441.—ED.]

Address: Brooklands Flying Club, Ltd., Brooklands Aerodrome, Byfleet, Surrey.

CINQUE PORTS

The improvement in the weather has had an immediate and marked effect on the flying hours at Lympne. Although for two whole days the high wind made instruction impossible, over forty-eight hours was flown during the week by Club aircraft, including two trips by Mr. Cliff to Berck with Club members in the Leopard. Miss Elser and Mr. C. Hilton-Simpson have joined and both have started instruction. Mr. D. R. McCartney did a successful night flight from Croydon in G-ABOG, which has recently had its C. of A., and is now to be kept almost exclusively for night flying. All blind-flying training will in future be done on the Tiger Moth.

Fourteen people, including members and staff, represented the Cinque Ports Flying Club at the Four-Club's dinner and dance.

Address: Cinque Ports Flying Club, Lympne, Kent.

The Others

THE address of those clubs and schools whose notes do not appear in this week's issue are as follows, and are given in alphabetical order. Since a very large number of these do not send weekly or monthly reports, the appearance of a club in the list is no guarantee of continued existence, and there may, of course, be one or two new or re-formed clubs of which we have no knowledge.

Aberdeen Flying School, Ltd., Dyce Airport, Aberdeen; Aero-8 Flying Club, Canute Air Park, Lower Canewdon Road, Ashingdon, Essex; Air Service Training Ltd., Hamble, Hants; Airwork School of Flying, Heston Airport, Hounslow, Middx.; Blackpool and Fylde Aero Club, Stanley Park Blackpool; Cardiff Aeroplane Club, East Moors, Cardiff; Cotswold Aero Club, The Aerodrome, Cheltenham Road, Gloucester.

Coventry Aviation Group, Whitley Aerodrome, Coventry; Drone Flying Club, Maylands Aerodrome, Romford, Essex; Dublin Air Ferries, Ltd., Kildonian Aerodrome, Dublin; Hampshire Aeroplane Club, Southampton Airport, Eastleigh, Hants; Herts and Essex Aeroplane Club, Broxbourne; Hull Aero Club, Hull Municipal Airport, Hedon, Hull; Insurance Flying Club, Hanworth Aerodrome, Feltham, Middx; Isle of Wight Flying Club Ltd., Ll. A Airport, Lake, Sandown, I.O.W.; Kent Flying Club, Bekesbourne Aerodrome, Nr. Canterbury; Lancashire Aero Club, Avro Aerodrome, Woodford, Cheshire; Leamington, Warwick and District Aero Club, Bishop's Tachbrook, Leamington; Leicestershire Aero Club, Braunstone, Leicester; Lincolnshire Aero Club Ltd., Waltham, Nr. Grimsby.

Malling Aero Club, West Malling, Kent; Marshall's Flying School Ltd., Fen Ditton Aerodrome, Cambridge; Newcastle-on-Tyne Aero Club, Woolsington Aerodrome, Northumberland; Norfolk and Norwich Aero Club, Mousehold Aerodrome, Norwich; North Staffordshire Aero Club, Meir Aerodrome, Stoke-on-Trent; Northamptonshire Aero Club, Sywell, Northants; Plymouth and District Aero Club, Roborough Aerodrome, Plymouth; Reading Aero Club, Woodley Aerodrome, Reading; Royal Air Force Flying Club, Hatfield Aerodrome, Herts; Scarborough Aero Club, Ganton, Scarborough; Scottish Flying Club, Renfrew, Nr. Glasgow; South Staffordshire Aero Club, Walsall Aerodrome, Staffs; Southend Flying Club, The Airport, Southend-on-Sea; Surrey Flying Services, Airport of London, Croydon, Surrey; Sussex Aero Club, Wilmington, Sussex.

Wiltshire Flying Club, High Post, Salisbury; Worcestershire Flying School, Tilesford Aerodrome, Pershore, Worc.; Yapton Aero Club, Ford Aerodrome, Yapton, Sussex; York County Aviation Club, Sherburn-in-Elmet, Nr. Leeds; Yorkshire Aeroplane Club, Yeadon Aerodrome, Leeds; and Yorkshire Aviation Services, Newton House Aerodrome, Londonderry, Yorks.

FOR THE NEWCOMER

Some Facts and Figures for the Uninitiated : How and Where to Learn to Fly : Ownership Costs

By INDICATOR

ONE of the most surprising things about this flying business is the comparative ignorance of the person who is known, for some entirely inadequate reason, as the "man in the street." Despite the fact that there are, in this country alone, some thirty-five subsidised clubs and a great many other unsupported organisations, the interested person who has not previously taken any notice of the movement appears to be quite unable to discover where, in his own immediate district, he or she may take a trial lesson or a complete course of flying. In the same way the person who wishes to travel by air line, as an experiment, never seems to know where to turn for information.

The trouble, of course, is that these people have not yet reached the stage in their interest when they automatically read the aeronautical Press week by week, and it is difficult to know how they can be reached in the ordinary way. However, for the benefit of the newcomers, the addresses of the different clubs and schools, whose notes appear every week on the second page of the section devoted to private flying, will be given in this week's issue.

One of the most common questions, and one which, at the same time, is most difficult to answer in a satisfactory manner, concerns the actual cost of learning to fly. There are three obvious reasons why this question can never be answered in an accurate sum of pounds, shillings and pence.

The first, of course, is that the hourly rates vary, for very good reasons, at the different clubs. However, these can be taken as varying between 35s. and 45s. for instruction and between 25s. and 45s. for solo flying. There are clubs and schools which charge both higher and lower figures, and the prospective pupil must himself balance the scales between convenience and cost.

Secondly, a pupil's aptitude will always be a matter for conjecture until he has reached the landing stage in his training. At that point the instructor will probably be able to guess the number of instructional hours which are still likely to be necessary before his pupil is ready to "solo," though learners often, after starting quite well, deteriorate badly and develop a number of original vices. A good pupil may take as few as five hours, while a poor one may take anything from fifteen to twenty-five. It would be fair to say that the average pre-solo time is in the region of ten hours. Another four or five must be added to cover the period between the first solo flight and the completion of the "A" licence tests, so that the average cost of learning to fly may be taken as being about £30.

The third reason concerns the unfortunate fact that a pupil who has obtained his licence is really only just beginning to learn something about the flying business. It would be true to say that the most experienced pilot is still very busy learning, but at the conclusion of some fifty hours of variegated flying a pilot possessed of normal common sense can usually be "taken off the lead" as far as familiar machines are concerned. Here, again, no definite figure can possibly be given, and there are quite a few pilots with hundreds of hours to their credit who are still incapable of pulling off a safe forced landing or of deciding whether to go on or to turn back when the weather closes in.

The "A" Licence Tests

In order to obtain his licence the pupil carries out two quite simple flying tests in the presence of an official Royal Aero Club observer and while carrying a sealed barograph, and must answer various questions concerning the general rules of air traffic and the like. About sixty questions must be expected, and eighty per cent. of the answers should be correct. The practical tests involve a fairly accurately placed landing after a glide from 2,000ft. without using the engine, followed by a series of five figure-of-eight turns at a steady height and another "spot landing." In actual fact, a good deal of latitude is permitted, since the instructor has already satisfied himself of the pupil's ability, and knows that he will be given real forced landing "dual" before being permitted to push off on any sort of cross-country flight. The whole responsi-

bility of training is really in the hands of the instructor, who must be both guide and philosopher to a most oddly assorted collection of different individuals.

During the past ten years the general system of training has followed that developed by the R.A.F. at the Central Flying School, and it would be difficult for anyone to improve on this as a system. Nevertheless, there is a steadily growing feeling amongst civil instructors that the type of training machine which is suitable and necessary for Service use is not at all the sort of machine which is necessary for the club pilot in the ordinary way. Clubs are, in fact, interesting themselves more and more in machines which are easy to fly and reasonably fool-proof, the feeling being that an hour or two of special instruction is necessary in any case with a strange machine, and that the less trouble a novice has at the start the better it will be for all concerned. Those pupils who are considering the purchase of their own machines are naturally desirous of obtaining their training in a machine similar to that which they eventually expect to buy, and there is a strong tendency, too, towards the cabin trainer, in which the pupil and instructor are able to converse in more or less normal tones.

Not-too-easy Training

There are, of course, two sides to every question, and a great deal is to be said for the good old system of using a machine which is fairly difficult to fly—or, at least, to fly well—and which is possessed of all the minor vices likely to be found in other machines. Once learnt, never forgotten, is an unfortunate fact where the absolute novice is concerned and if an easy machine encourages faults in the early stages these faults may be very difficult to eradicate.

Another problem concerns the advent of the low-wing cantilever monoplane which is, more often than not, fitted with flap gear. The well-trained pilot of the standard biplane can always put up some sort of show with a strange machine, but this comparatively new development requires a flying technique which is really sufficiently different to demand special training. That is not to say that there is anything essentially difficult about the type, but merely that the best results cannot be immediately obtained by the pilot who has been trained on a normal machine.

Contrary to popular opinion, there is nothing either difficult or dangerous in the business of flying an aeroplane in reasonably good weather conditions, and the pupil usually learns to carry out all the normal evolutions with fair accuracy after a matter of two or three hours' instruction. Even the correct estimation of landing height presents no difficulties to individuals who habitually travel precariously about in cars or on motor cycles over roads on which every mile brings a new problem requiring quick judgment. The operation of a new form of directional control—the rudder pedal—demands a certain degree of concentration, but the knack is soon learned.

The fountain-head of all the pupil's difficulties lies in the twin problems of the approach and the three-point landing. Only practice can show the pupil when to close the throttle for the approach, and only a suddenly developed instinct will show him when to ease back the control column for the final touch-down. During the early stages of instruction the victim will undershoot and overshoot, and will progress across the wide spaces of the aerodrome in a series of inebriated hops, while an otherwise charming instructor will roar advice and contumelious remarks at him. Let it be clearly stated, however, that the only difference between the novice motorist and the novice aeronaut is that the latter can do rather more damage both to an expensive piece of machinery and to an irreplaceable zoological exhibit—the novice himself. Generally speaking, there are fewer things to worry about when in the air.

If it is difficult to assess the cost of flying training, it is even more difficult to give any reliable figures covering the costs of ownership, since these will depend on the type of machine chosen, on the number of hours flown during the year, and on the insurance policy required—the cost of which will again depend on the experience of the owner in question.

We might, however, endeavour to obtain some approximate costs from a study of two extreme types, one a second-hand light aeroplane of a conventional pattern and flown by a fairly inexperienced pilot, and the other a four-five-seater twin-engined machine which is being flown very seriously by an experienced man—perhaps with a "B" licence. In each case the somewhat vital figure of depreciation must necessarily be left out as this might be negligible in the case of the small machine and would certainly be impossible to assess in the case of the larger. So much depends on supply and demand when dealing with the comparatively small number of prospective owners of this class of machine. However, there is, after the initial loss on semi- or total obsolescence, no depreciation at all in the sense to which car people are accustomed, since proper maintenance is demanded, so to speak, by law.

Working It Out

The first owner, who paid perhaps £300 for his machine, may do a matter of a hundred hours' flying in the course of a year. His fuel—with an engine using an average of six gallons an hour—will cost him £45, and his oil—at the rate of a pint an hour plus a regular twenty-five hour replacement—a matter of £10. Insurance, for which he will be satisfied with a third-party policy, will cost him about £10, and hangarage at any aerodrome will not cost more than £45, and this figure usually includes all the normal tarmac services in the matter of wing-folding and engine-starting. The yearly Certificate of Airworthiness overhaul may involve any sum in the world, but, if reasonable care has been exercised during the year, this should not come out at much more than £25, to which must be added the five guineas charged by the Air Ministry for an official "look-see." Occasional repairs of a minor nature may tot up to £10. At any rate, the sum total of £150 is on the generous side and this works out at 30s. an hour—or 4.5d. a mile at a cruising speed of 80 m.p.h.

Our second owner might be allowed a five-hundred-hour year, in which case his fuel and oil bill would be in the region of £500—the machine has two engines—and a full insurance policy covering all damage would, worked on an approximate daily rate, come out at £70. Hangarage might reasonably be put down at the same sum and general maintenance and complete overhaul costs at £200. The total of £840 may appear at first to be a little staggering, but the cost every hour is only 34s., or, at a cruising speed of 120 m.p.h., a matter of 3.4d. a mile.

It is all a question of yearly mileage, just as it is in the case of the car owner, and these purely hypothetical figures are given merely to provide some idea of the relative costs, which may appear high when thought of in a lump sum, but are reasonable enough when the considerable mileage is taken into consideration.

NOW—AND NEXT MONTH.

THIS issue of *Flight* is devoted to light aircraft and private flying. The smaller types of machines and their equipment are reviewed in detail and much valuable information of direct interest to the new-comer to the flying movement and club life is embodied.

On May 21 next a companion issue will be published, devoted to airlines and the commercial transport side of aviation in general, including, of course, the now extensive Empire Air Routes.

COMMERCIAL AVIATION

— AIRLINES — AIRPORTS —

THE WEEK AT CROYDON

Summer Time Services : A Twentieth Century Wizard : Official Transport : Specials : Air Hostesses

CONSIDERABLE service alterations are made about now, owing to change-over to Summer Time on April 19. Incidentally, April 19 was the tenth anniversary of the K.L.M.-A.B.A. Scandinavian Air Express, linking London with Copenhagen and Malmo. This summer, when Bromma airport, Stockholm, is opened, that city will be the terminus of this service. K.L.M. uses Fokker F22 and Douglas machines, and A.B.A. employs Fokker F22s and Junkers Ju.52s. The whole journey, London-Stockholm, will be flown in less than eight hours, and this, it is claimed, will be faster than any other service to Scandinavia. Connections by air will be given to Gothenburg and Oslo from Copenhagen and to Helsingfors and Tallinn from Stockholm.

Switzerland by Imperials

Imperial Airways opened up the London-Basle-Zurich service for the summer on Monday, April 20, with that most useful of the smaller air liners, the D.H.86, which type, incidentally, opened up the Imperial London-Budapest line on Friday, when Mr. Robert Brenard was seen leading a party of journalists aboard. A couple or so days later the K.L.M. Blue Danube Air Express, *via* Prague to Vienna, also took aboard several London journalists. It is understood that one journalist with a passion for air travel, or who is collecting data for a book on night life and national beverages in Europe, accepted both invitations, and made both trips.

Everybody at Croydon will be sorry to part with Mr. S. F. Witcomb, who has been chief meteorological officer at Croydon since June, 1929. Pilots of all nations place implicit trust in Mr. Witcomb's forecasting, and in his shrewd common-sense attitude towards weather problems. Mr. Witcomb is to return to the Air Ministry, London, and one hopes that the move means the promotion which his work at Croydon during the past seven years has very definitely merited in the eyes of those among whom he associated. Mr. Witcomb joined the Artists' Rifles in January, 1915, transferred to Meteorological Section, R.E., in July of that year, was a "weather balloonatic" for a time, and was with the Independent Air Force up to the Armistice, when he entered the Meteorological Office Forecasting Service, and has been associated with the aviation side ever since.

Forecasting Extraordinary

Asked for an opinion of Mr. Witcomb from a pilot's point of view, one of the very senior air route pilots said, "We place more reliance on his forecasts than on those of any other meteorologist. He is as near perfect (as a forecaster) as is humanly possible, and his uncanny positioning of a 'front' (often within a few miles of its actual position) from data received the previous evening has been an unfailing source of wonder to professional pilots." In another age Witcomb's uncanny abilities would probably have led him to the stake as a wizard. When I wish him the success he deserves I echo the sentiment of all who have known him at Croydon.

Another loss to the airport is Capt. Adkings, who has been manager of the Airport Hotel for the past fourteen years. Affectionately known as "Tommy" to numerous friends of different nationalities, he has managed to remain popular (as well as efficient) in an extremely difficult position. We are all wondering why he is leaving after so many years of faithful service to his company.

One of the star air arrivals last week was a special twin-motor Potez machine, cream-coloured, and with a high gloss finish, the property of the French Air Ministry, and used, apparently, for conveying important Government officials from place to place. It was piloted by Capt.

Commercial Aviation

Rossi (co-pilot of Codos), and it brought Gen. Mouchard and Commandant Guerrier de Dumast to London for the Staff talks. It would surely increase British prestige if the Air Ministry kept a transport machine for the visits of our Ministers, diplomats, and generals to foreign countries.

On Tuesday of last week a twenty-months'-old baby, Edward Brown by name, arrived at Croydon from Melbourne, with the Imperial Australian mail machine. The child, complete with parents, will take boat to America, fly across the continent by T.W.A., and then take boat again for Australia. By the time Edward is at his preparatory school it will not be necessary to cross the Atlantic in a boat.

Special week-end flights are being arranged by K.L.M. to see the bulb fields of Holland from the air. The itinerary actually includes much more than the bulb fields, for the passenger sees large stretches of Dutch countryside and a number of old-world towns from the air, as well as the line of blue sea and golden dunes bordering Scheveningen, where Samuel Pepys stayed and where exiled Charles II awaited the summons to return to his Crown and country.

British Continental Airways made a special flight to Ostend last week when the parents of Mr. E. Baker, who had been injured in a football match abroad, desired to reach their son quickly. Capt. Hattersley flew them to Ostend, where he made a night landing by means of his wing-tip flares, for there are no night-lighting facilities at Ostend, even in 1936.

Two maidens of bashful sixteen recently wrote asking me how to get jobs as air stewardesses. It is not so easy, because we in England have not taken to the idea, partly because it is a new one, partly, perhaps, because it is an American one, and mainly, it may be, because we do not care to feed from any hand but that of a waiter, and regard waitresses with suspicion, since they are not often employed in the more exclusive eating places! Swissair and K.L.M., the only European companies to carry air hostesses, naturally employ their own nationals.

A. VIATOR.

New Highland Service

HIGHLAND AIRWAYS, who have pioneered the Aberdeen-Kirkwall Air Service since May, 1934, will re-open this run on May 4. Last year the service operated with Kirkwall as the base, but this year, in order to take care of the Shetland extension, the machine will be kept at Kintore, departing from there at 12.15 p.m. All trains arriving from the south connect with this departure. Passengers returning from the North will arrive at the Palace Hotel, Aberdeen, at 6.35 p.m., and in time for the southbound trains.

It is understood that the radio station for Sumburgh, Shetland, has been shipped, and will be installed very shortly. As soon as the tests have been completed, the Aberdeen-Kirkwall service will be extended to Shetland. Until the end of June this section will operate on Mondays, Wednesdays, and Fridays, and during July and August will operate daily. The time-table is so arranged that the machine will not depart from Kirkwall on the return journey until 4.30 p.m., thus allowing the necessary time for operation of the Kirkwall-Sumburgh section after the machine's arrival in Kirkwall at 1.50 p.m. Experiments are being made with the idea of using faster aircraft, and it is hoped to put on, in June, a machine cruising at 130 m.p.h.

The company's Inverness-Wick-Kirkwall service has operated since January, during one of the severest winters that has been known for many years, without the aid of wireless, and with 99 per cent. regularity—only one day having been missed. 17⅛ tons of mail were carried during the first three months of the year.

Air Mail Revision

MANY of the air mail services have been revised and the new edition of the Post Office pamphlet, which was introduced last week will be of special interest.

Seven Stations

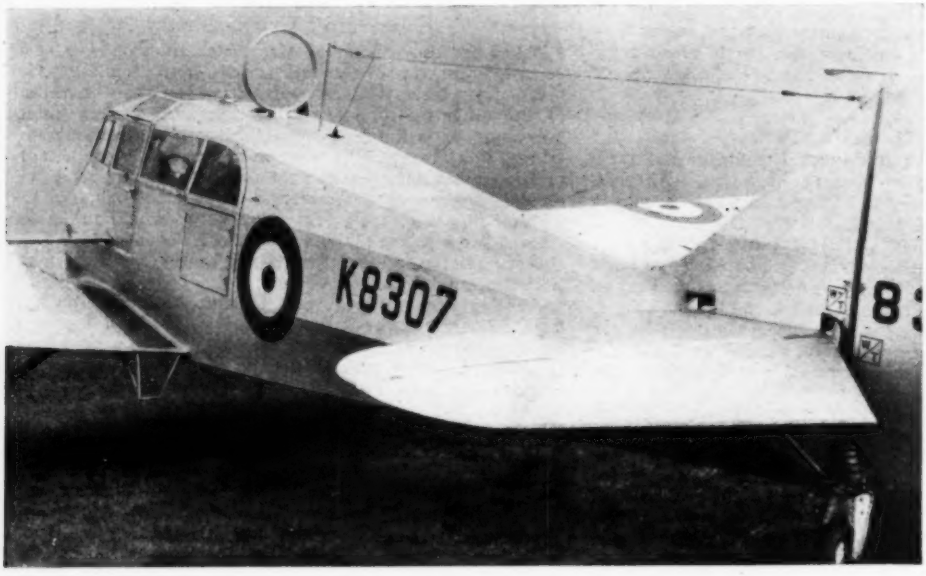
APART from the Air Ministry stations at Croydon, Lympne and Pulham, seven D/F stations are now in action in this country. These are at Bristol (Whitchurch), Heston, Hull (Hedon), Manchester (Barton), Belfast (Newtownards), Portsmouth and Renfrew, and are in service between 7 a.m. and 10 p.m. daily.

Gold Rushing

AIR DISPATCH has been kept extremely busy lately transporting vast quantities of gold between Paris and London and London and Paris. The daily newspapers announced last week that £4,000,000 had been brought from Paris by air in two days and, judging by the number of trips made by Air Dispatch, that company must have carried a great deal of it.

The Army Co-operation flying is expected to continue all through the summer. Recently a new tender came in from the Air Ministry. This has been accepted and should result in a big increase in the night flying done for this type of work.

The company has engaged two more pilots and wireless operators, and also purchased two new aeroplanes, one of which is an Airspeed Envoy.



FOR BLIND APPROACHES: One of two Monospar S.T. 25s which have been equipped for the wireless flight at Farnborough. This machine has full dual control, with a hood for one pilot, Lear direction-finding equipment, Sperry Horizon and directional gyro, a Reid and Sigrist turn indicator, a Kollsman sensitive altimeter and a Smith rate of climb indicator. (*Flight* photograph).

FOR RAPID PEREGRINATIONS

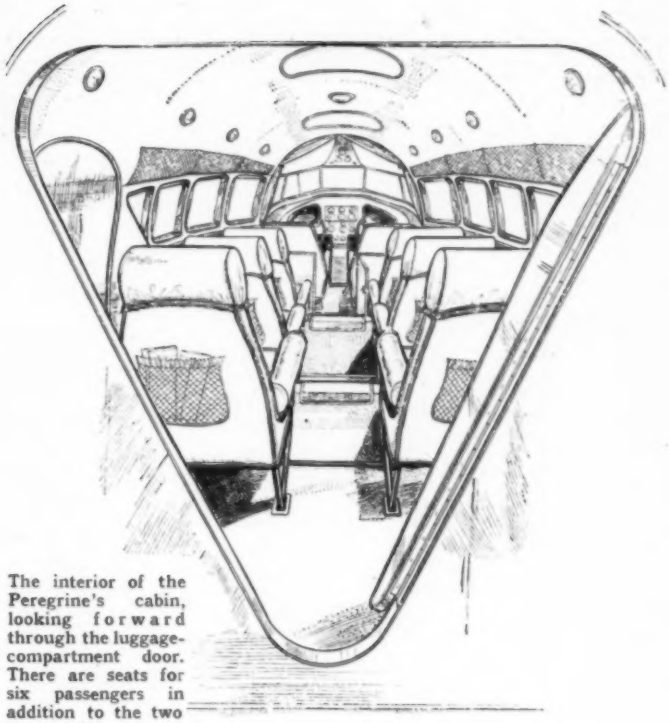
First Miles "Twin," the Peregrine, Nearly Ready : Retractable Undercarriage to be Fitted

A PRELIMINARY description of the Miles Peregrine twin-engined, high-speed transport or military trainer was given in *Flight* of November 14, 1935. Since then work has been proceeding at Reading on the prototype machine, and a number of alterations, notably the fitting of a retractable undercarriage, have been specified. Variable-pitch airscrews will be offered as alternatives to the fixed Faireys and presumably the Gipsy Six Mark II, which is designed to give a higher continuous power output than the standard model, could be fitted if desired.

The new undercarriage is of Phillips and Powis design and retracts hydraulically into the engine nacelles.

Provision has been made in the design of the Peregrine for the installation of equipment rendering it suitable for the training of pilots and crews of modern twin-engined military machines.

The preliminary data are: maximum speed, 188 m.p.h.; cruising speed, 164 m.p.h.; weight empty, 3,200lb.; weight loaded, 5,000lb.; take-off run, 220 yd. (5 m.p.h. wind); landing run (5 m.p.h. wind), 200 yd.; fuel consumption (2,050 r.p.m.), 17.5 gal./hr.; duration, 5¾ hr.; absolute ceiling, 23,000 ft.; single-engine ceiling, 5,000 ft.; climb to 5,000 ft., 5 min.



The interior of the Peregrine's cabin, looking forward through the luggage-compartment door. There are seats for six passengers in addition to the two pilots.

UNDERTAKING into OVERTAKING

FROM a correspondent who knows his Burma comes the contribution which follows. Just how seriously he should be taken we leave to the judgment of those readers who also know their Burma; but his effort is too good for the waste-paper basket, and we at least are salving our consciences with the thought of the "grave, helpful, sympathetic, dignified and expensive spirit" (*vide* our correspondent) which animates corresponding ceremonies at home in England.

Limited though the facilities are for commercial aviation in Burma (he writes) an unexpected line of business has been disclosed in the craving of the Burmese to send their dead priests or *phonggyis* on pre-cremation cruises into the blue sky. Several applications for funeral flights have had to be refused; but in two cases at least they have been arranged, and have given immense satisfaction.

Phonggyis in Burma do not die, but merely fly away. The word *phonggyi* means Great Glory. The funeral of a *phonggyi* is a *Phonggyi Byan*, or a Flying-away of the Great Glory; and the act of dying is *Pyan daw mu de*, the flying-off.

As a rule there is a week's lying-in-state while the crowds feast and (under special permission) gamble. When the propitious moment arrives the coffin is caught up by a heavenly bird and rises on a rope (there is a wheel and a pulley in the bird's stomach) to the high pyre waiting for it. Thus the flight, though a poor and rather jerky one, is accomplished. But obviously the possibilities of scientific and commercial co-operation are immense. We have motor hearses in England (which are presumably maintained to make money); so why not flying hearses in Burma for the same motive?

The Burmese public has an insatiable craving to send the bodies of dead priests as high into the air as possible, and they are prepared to pay large sums for the privilege. It may not be the way in which the British public might desire to spend its substance, but it is what the Burmese want. If we do not provide the amenity, there is not a doubt but that the enterprising Japanese will shortly be sky-piloting Burmese saints.

The technique requires a little study, but not much. The aeroplane should, with the help of a little red and gold enamel, and a couple of aluminium legs and a beak, resemble a heavenly bird. Pictures on pagoda walls will furnish details. There would, of course, be a regular traffic: say a pound for ten minutes' cruise for mere novices (I mean dead novices, of course). A village priest would pay more, and a *Gaing Ok* or a *Gaing Dauk* (a sort of bishop) would go up to considerable heights, both as regards altitude and fees, and remain aloft for an hour or so. A *Tha-tha-na Baing*, or archbishop, who would only be procurable once in a way, should all but touch the aircraft's ceiling.

Again, local priests, provided they are dead, shed sufficient lustre and benediction to justify a cruise over the neighbourhood, circling those villages (five bob a circle) which pay for the privilege. There is no town or village in Burma which would deny itself this omen of good luck.

Brighter Rites

These suggestions are made in all seriousness. Here is a demand to be satisfied. Here is a field for commercial enterprise which, like our own funeral institutions, requires to be approached in a grave, helpful, sympathetic, dignified and expensive spirit. The details would require thought. For palls, of course, you would substitute golden umbrellas. Instead of wreaths you would tie trails of squibs to the fuselage. An occasional release of toy balloons would be effective. Instead of dismal undertakers the firm would supply clowns, since a *Phonggyi Byan* is essentially a festive ceremony. The pilots would be chosen for their wit as well as for their patience and endurance. Their faces would be painted blue and yellow to make them resemble *Bilus* (good-natured devils), and for this they would doubtless expect a little something extra. The ground staff when on duty would wear wings, beaks, claws, tails, and other features in harmony with the appearance of the aircraft which, as I have noted, would be disguised as a galon, serpent, naga, goose or other heavenly monster. There are endless possibilities.

HERE and THERE

"Cowling and Cooling"

OWING to pressure on space, caused by the inclusion of special features devoted to light aircraft, the second instalment of last week's article on "Cowling and Cooling" is unavoidably held over until next week.

New Airport for Southern Ireland

THE Cork authorities are considering the establishment of an airport and seaplane station in the neighbourhood of Cobh (Queenstown).

The various authorities who are interested in this matter, namely, the City Council, Cobh Urban District Council, Cork Harbour Commissioners and the Cork County Council, are combining in order that the matter may be considered from the point of view of their joint interests.

It is hoped that the site for the airport may be in the proximity of the seaplane station, so that passengers may be readily transferred. Chamier, Gilbert-Lodge and Co. have been appointed as consultants to the authorities.

The Lowe-Wylde Memorial Fund

UP to April 15 the contributions to Lowe-Wylde Memorial Fund had reached a total of approximately £705, the latest donations being as follows:—

	£	s.	d.
Dudley C. Folland	3	3	0
A. H. L. Eccles	2	2	0
F. W. Dixon	1	1	0
F. S. Barnes	1	1	0
H. P. Bowler	1	1	0
W. U. Dykes		10	0
B. G. Bailey		5	0

Donations, which are still urgently required to bring the total up to £1,100, should be sent to Mr. E. C. Gordon England at the London Air Park, Feltham, Middlesex. The objects of the Fund were set out on page 303 of *Flight* of March 19 last.

AERONAUTICAL PATENT SPECIFICATIONS

(The numbers in brackets are those under which the Specifications will be printed and abridged, etc.)

Published April 16, 1936.

23688. SIEMENS & HALSKE AKT.-GES: Apparatus for automatically steering aircraft and other moving bodies (444,393).
26350. JOHNSON, D.C. CROOM: Means adapted to enable aircraft to pick up, while in flight articles or persons (444,245).
26662. CIERVA AUTOGIRO CO., LTD., HODGESS, F. L., and BENNETT, J.A.J.: Aircraft sustaining rotors (333,395).
26708. CIERVA AUTOGIRO CO., LTD., and BENNETT, J. A. J.: Aircraft sustaining rotors (444,485).
26733. BOUR, E. F.: Airscrew for aircraft, with automatically variable blade pitch (444,329).
27172. WEBB, K. W.: Landing and flying lights for aeroplanes (444,326).
16223. CERIN, J.: Cowlings for air cooled aircraft engines (444,448).

Published April 23, 1936.

23934. DRABBLE, J. E. L.: Apparatus for increasing the field of vision in aircraft (444,749).
26566. WILKENING, F. W.: Aircraft with a rotating-wing system (444,572).
26893. BENDIX AVIATION CORPORATION: Brakes (444,575).
27225. BRISTOL AEROPLANE CO., LTD., FEDDEN, A. H. R., and OWNER, F. M.: Airscrews for aircraft (444,586).
27226. BRISTOL AEROPLANE CO., LTD., FEDDEN, A. H. R., and OWNER, F. M.: Joints for the roots of metal airscrew blades (444,587).
27733. BENDIX AVIATION CORPORATION: Transportable power units (444,821).
30295. BOYKOW, J. M.: Automatic control of aircraft in curved flight (444,827).
7170. SIEMENS APPARATE UND MASCHINEN GES.: Apparatus for automatically stabilising the speed of aircraft (444,715).
11258. BLERIOT AERONAUTIQUE: Aircraft (444,609).
25131. GRUMPELT PROPELLERBAU GES.: Airscrews (444,742).
27891. BENDIX AVIATION CORPORATION: Brakes (444,614).
27892. BENDIX AVIATION CORPORATION. Brakes (444,615).
34228. REZLER, J.: Release device for parachute packs (444,808).
18499. SCHWARZ GES.: G.: Air propellers (444,746).

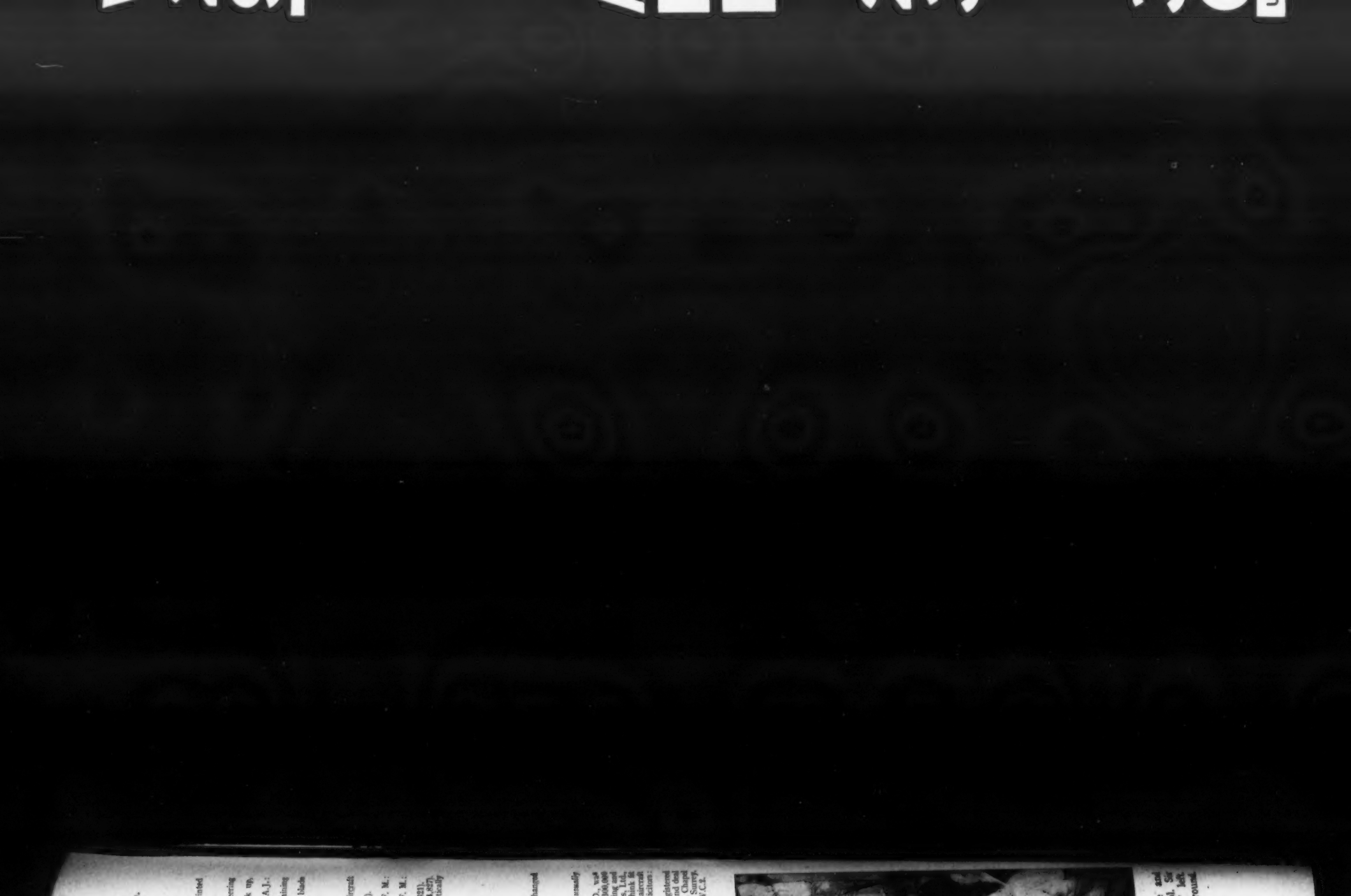
CHANGE OF TITLE

AIRCRAFT COMPONENTS LTD., Arle Court, Cheltenham.—Name changed to A.X.C. Ltd. on March 24, 1936.

NEW COMPANIES

In the notes below, for reasons of space, the "objects" of new companies are usually somewhat abbreviated.

THE AERONAUTICAL CORPORATION OF GREAT BRITAIN, LTD., was registered as a "public" company on April 15 with a nominal capital of £300,000 in 1,200,000 shares of 5s. each. Objects: to acquire the goodwill, undertaking and assets of Light Aircraft, Ltd., Lang Propellers, Ltd., and Aircraft Accessories, Ltd., or not less than 90 per cent. or such less proportion as the company shall think fit of the respective issued share capitals; to manufacture, repair and deal in aircraft of all kinds. The first directors are to be appointed by the subscribers. Solicitors: Denton Hall & Burgin, 3, Gray's Inn Place, London, W.C.1.

LINCOLNSHIRE AIRCRAFT COMPANY LTD.—Private company, registered April 15. Capital, £4,000 in £1 shares. Objects: to manufacture, repair and deal in aeroplanes, seaplanes, etc. The directors are: Robert R. Pinniger, 41, Chapel Road, London, S.E.27; Bernard C. Gotelee, 17, Beeches Walk, Carshalton, Surrey. Registered Office: Willingham House, 44, Essex Street, Strand, London, W.C.2.

CO-OPERATION: A photographic pause during the Four-club dinner—Brooklands, Cinque Ports, Northamptonshire and South Coast—at the Park Lane Hotel, London, a report of which appears on p. 441. Standing at the top table are Lt.-Col. Sir Francis Shelmerdine and Lady Shelmerdine, with Dame Ethel Locke-King and Capt. Duncan Davis on Sir Francis' left. Mr. Percy Bradley is on Lady Shelmerdine's right. Mr. W. E. Davis and the Cinque Ports contingent can be seen in the foreground.